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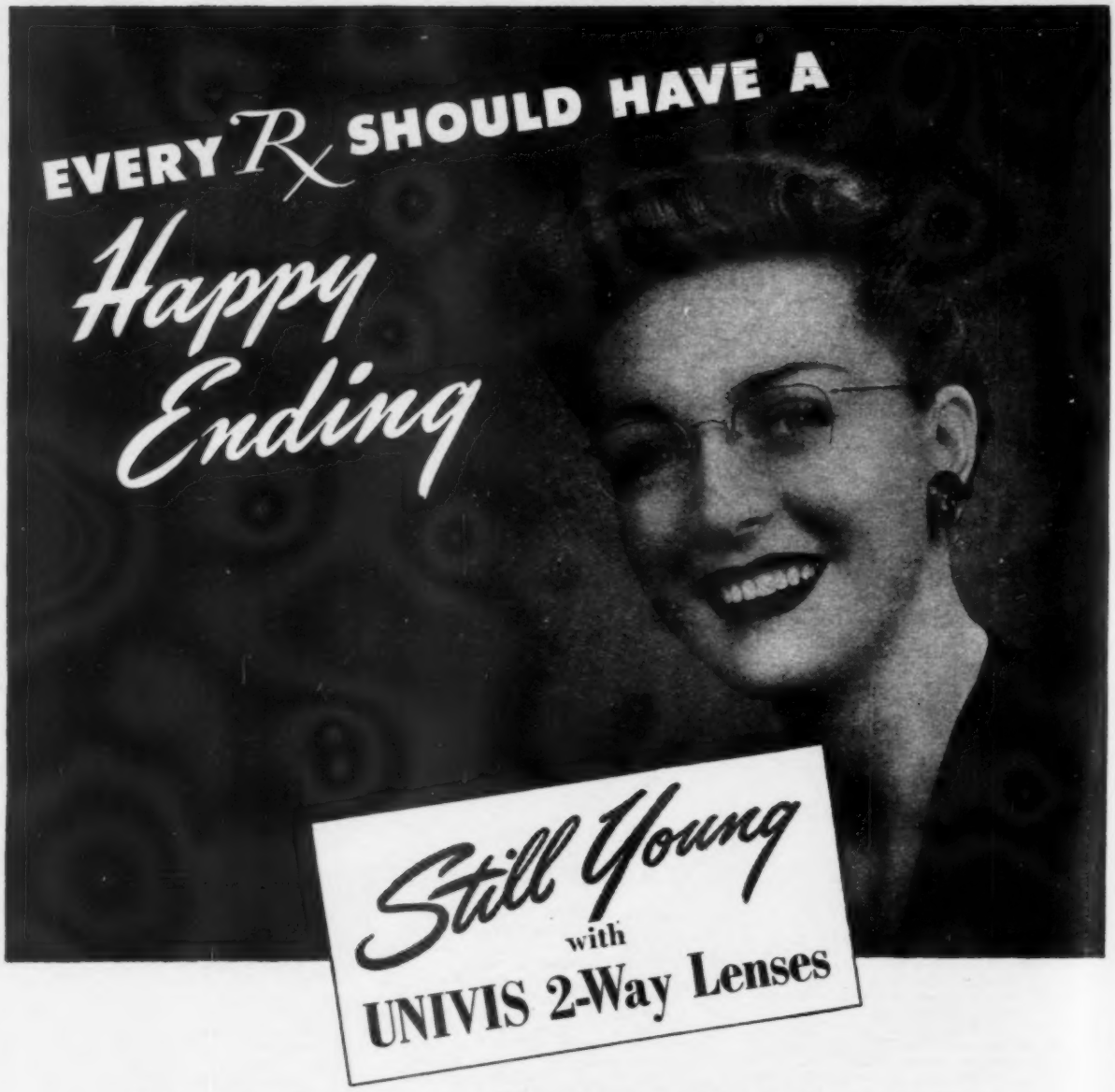

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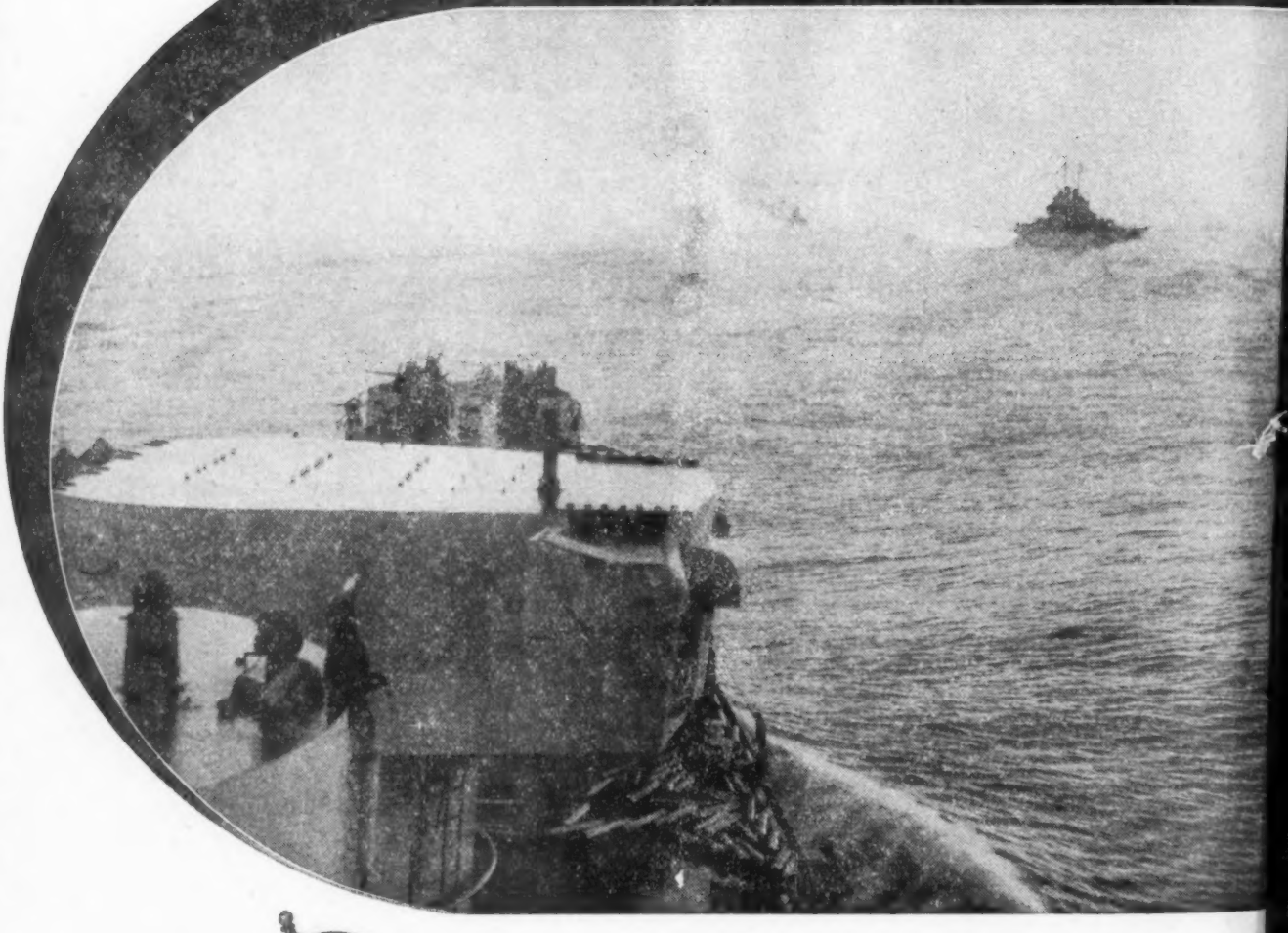

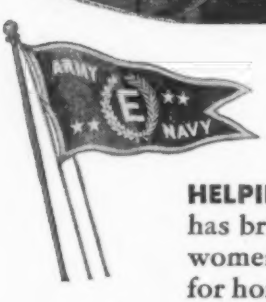

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THE NEED FOR EDUCATION NEVER ENDS

Eyes that plead for help!

They are warning you, Mother. Those distressed eyes are trying to explain that something is wrong.

That they ache, perhaps. Or that the words in the spelling book look blurry and queer. That they won't "stand still".

And that the writing and numbers on the blackboard look so far away . . . the pictures so distorted . . . "faded" . . . hard to see.

On your guard, Mother. Don't take those precious young eyes for granted. Make sure about them. Free your struggling child from the hopelessness, bewilderment, fear—that school work brings.

Remember that a child's education depends largely on what she *sees*. 83% of knowledge [illegible] gateways [illegible] vision.

Understand, too, that vision is a *learned* function. It has to be developed. A child has to *learn to see* just as she has to learn to walk, run and swim. Perfecting a fine seeing pattern isn't always easy—especially when eyes are defective.

And 25% of all eyes of school age are at fault. These faults are of many kinds. They produce all sorts of stumbling blocks to clear, sharp, strain-free vision. Objects are made to appear double. Or blurred. Or distorted. Or not at all. . . . Obvious results are eye-strain, nervousness, headaches and other ills.

Learning becomes a torment. Failure results, naturally. A child is unfairly classed as dull, awkward. Behavior, personality, progress—all are bound to be affected—adversely.

So, you see, Mother, why eyes should be looked after early—and often—just as are teeth, heart, lungs. By a competent, professional man of course. The scientific services of the Ophthalmologist and Optometrist, and the technical skills of the Ophthalmic Dispenser (Optician) can do wonders in freeing eager young minds from the shackles of poor vision and eye-strain.

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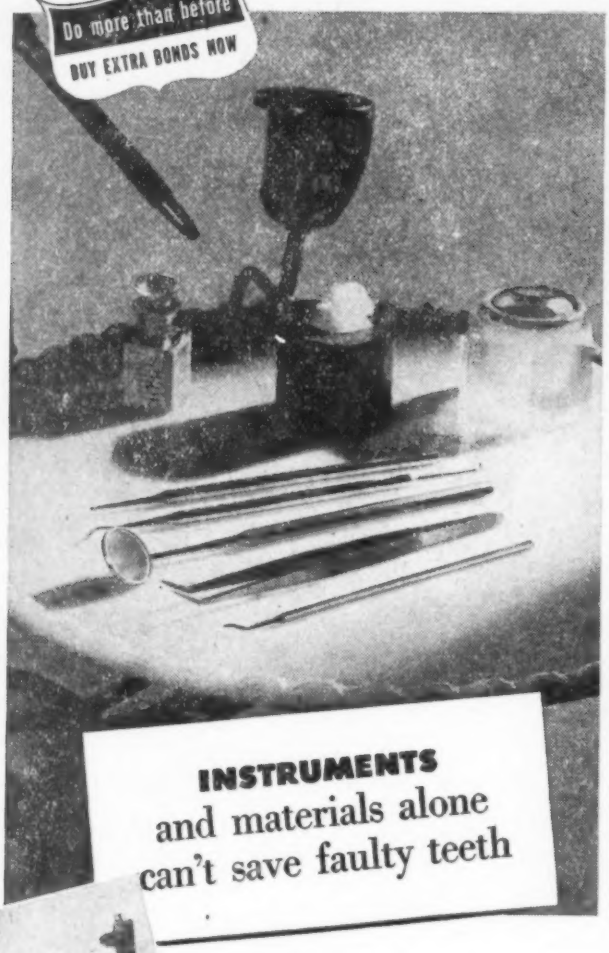
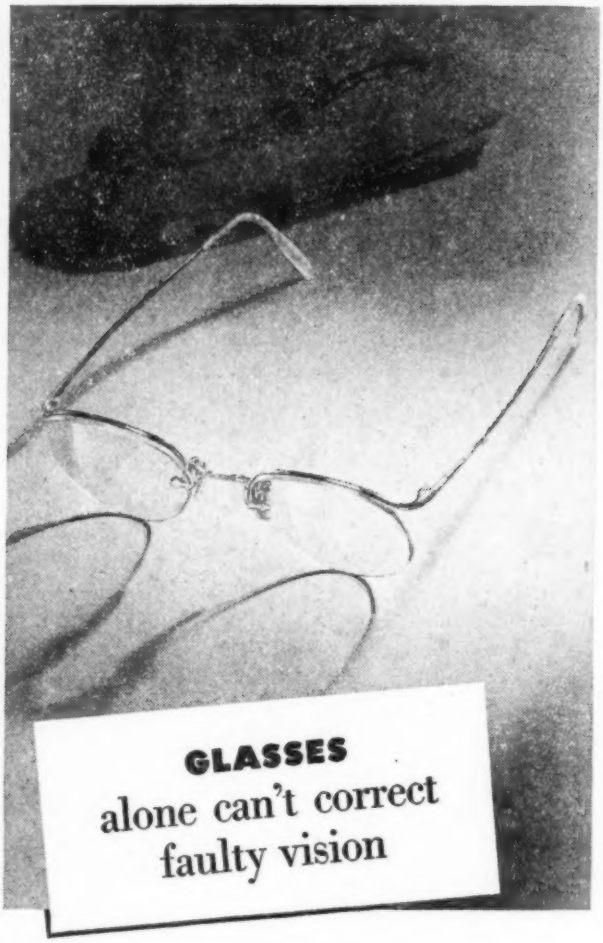


INSTRUMENTS
and materials alone
can't save faulty teeth



GLASSES
alone can't correct
faulty vision

When you need dental care you seek the services of a dentist. You know that the instruments and materials he uses are important, but what you want most of all is to benefit from his professional education, experience and skill.

But are you just as wise about your eyes? When you need eye care do you make the mistake of saying: "I'd better buy some glasses"? Actually that's faulty reasoning.

SEEK PROFESSIONAL ADVICE
— not glasses at a price

Glasses, like dental instruments and materials, are important, of course, but glasses alone can never correct faulty vision.

Your eye comfort and visual efficiency depend upon the professional and technical skill with which your eyes are examined and refracted; your glasses prescribed, your prescription interpreted, your glasses fitted and serviced.*

And it's faulty reasoning, too, if you mistake the fee for these professional services for the price of glasses. In eye care, as in dental care, the fee you pay is "for professional services rendered." And remember that glasses alone *without* professional eye care are never a bargain at any price.

So go to your Ophthalmologist, Optometrist, Ophthalmic Dispenser for the professional skill and services that your priceless sight demands.

Invest in eye care — not glasses at a price.

American Optical
COMPANY

S LARGEST [illegible] TO THE OPHTHALMIC PROFESSIONS

Scheduled for publication in Life, September 4; Saturday Evening Post, October 7; Look, October 17; and the November issue of Good Housekeeping.

153 million full pages....

. . . DEDICATED TO THE ADVANCEMENT OF PROFESSIONAL EYE CARE

In June, 1942, AO inaugurated its AMERICAN Plan educational advertising campaign to help correct the public misconception of the true relation of glasses to eye care and visual efficiency.

During the two years and more that this campaign has been active, over 153 million copies of AO full-page messages, dedicated to the advancement of professional eye care, have appeared in *The Saturday Evening Post*, *Life*, *Look*, and *Good Housekeeping*.

The next in this continuing series of AO educational messages appears on the opposite page. This message, like all that have preceded it, is written around the theme—"Seek professional advice—not glasses at a price."

This entire AMERICAN Plan campaign is based on the need for public recognition of professional eye care. Recognizing that glasses are a therapeutic device, it does not advertise glasses, but rather, is written to impress upon millions of readers that professional services–(not glasses at a price)–are the all-important factors in eye care.

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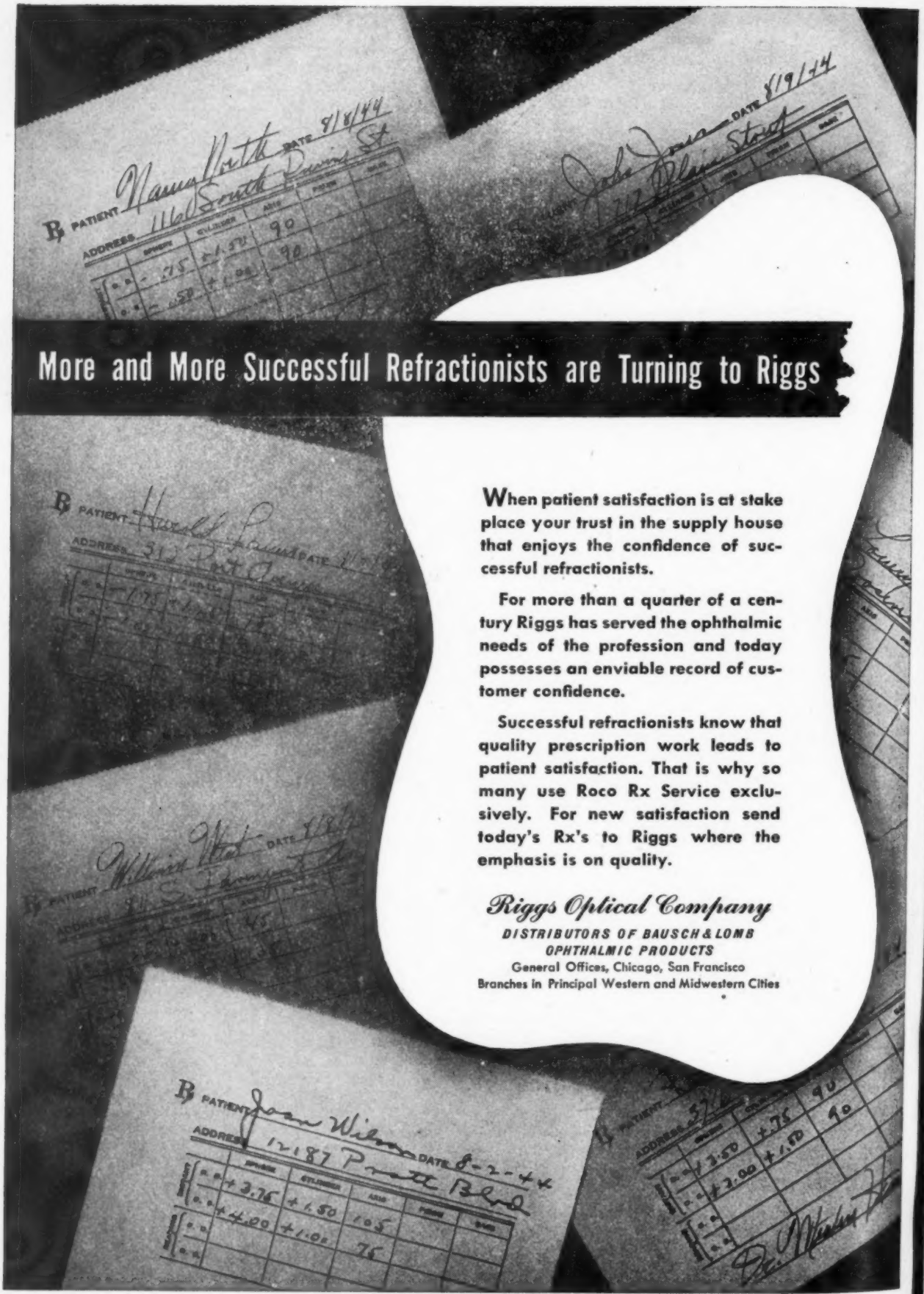

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THE FITTING OF CONTACT LENSES BY THE MOLDING TECHNIQUE*

Solon M. Braff, A.B., O.D.
Los Angeles, California

The recent, growing interest evidenced by optometrists in the fitting of contact lenses is a welcome indication of the acceptance of this important sphere of optometric endeavor. It is unfortunate, however, that until recently, the greatest criticism of contact lenses came from those optometrists who had, perhaps inadvertently, neglected to follow the progress made in this field. It is true that, as short a period of time as six years ago, contact lenses were not practical in most cases because of accepted inaccuracies and technical difficulties.

It is the purpose of this paper to acquaint the members of our profession with the accomplishments and the modern procedures performed in the fitting of contact lenses. To achieve this result, a short summary of the history of contact lenses will be given, together with a discussion of the practical steps necessary in executing a satisfactory fit.

In 1827, an English astronomer, Sir John Herschel, suggested the use of a glass shell to protect the cornea from a diseased lid. Later, in 1888, Dr. A. E. Fick, a Swiss physician, recommended the use of this glass shell as a refractive device and named it Kontackbrille (contact lens). Until 1932, many others, including F. E. Müller, August Müller, Kalt, Sulzer, Lohnstein and Siegrist, conducted various experiments but, because of varied technical hindrances, interest was generally sporadic and success limited. In 1932, Dr. J. Dallos, a Hungarian eye physician, found that Pollner's Negocoll, a molding material, was adaptable to making negative eye impressions. Although reported in the German press in 1933,

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this discovery was not available for American consumption until 1936 when it was translated into English and published in this country. Renewal of interest in contact lenses was immediate. For those who had been attempting to fit aspheric eyes with spherical contact lenses, the disclosure of a means of taking human eye impressions offered an approach to the more fortunate conclusion of a problem which had, heretofore, been met with definitely restricted success.

The results of subsequent experimentation were productive and gratifying. Polymethyl methacrylate (lucite and plexiglass), a thermoplastic acrylic resin, was found to be adaptable to molding to the positive casts of Negocoll eye impressions. These plastic lenses were found to be superior to the previously used glass lenses in many respects. They were lighter in weight, did not craze, possessed a light transmission of 92 per cent, and, perhaps most important, could be adjusted after molding.

A discovery, important in itself, led to the exposure of an erroneous ophthalmological acceptance. The discovery, made by Theo. E. Obrig, a New York optical scientist, was the fluorescein test in determining areas of corneal contacts by the lens; the medically accepted tenet was that the cornea was round and no greater than 12 mm. in diameter. Accepting the medical data, contact lens manufacturers had prepared their lenses with 12 mm. corneal diameters. Obrig's experiments, incorporating his fluorescein test, revealed that in the majority of his cases the lenses were touching the corneas. Careful measurements of 1,000 individual casts disclosed that the cornea was not round but oval, and that the average size was 12 mm. x 13.6 mm. Only 5 per cent showed a horizontal diameter of 12 mm. or less, while 38 per cent were 14 mm. or more.

This is, indeed, a short summation of the work of over one hundred years, but it does give us an understanding of the many obstacles met by those seeking to develop a contact lens which would serve its many-purposed destiny.

The uses of contact lenses are many and varied. As refractive devices they are used to correct for the various forms of ametropia, for retinal image distortion produced by corneal ulcers and scars, for keratoconus and keratocele. As ophthalmological devices they have been used in many instances of corneal involvement and diseases of the lids likely to affect the cornea. Their vocational and avocational uses are many, including such spheres of endeavor as the theater, motion pictures, aviation, lecturing, surgery, dentistry, boating, football, basketball, tennis. etc.

The fitting of contact lenses is an exact science necessitating the employment of many techniques foreign to ordinary optometric practice. The mastery of these techniques is a prerequisite to a satisfactory conclusion.

The ability to understand and correct for the particular problems associated with this work is a matter of thorough training and practical experience. The following procedures have been found most satisfactory in adapting molded plastic contact lenses to the human eye. However, it is strongly urged that those who signify an interest in this work find some means of supplementing a knowledge of the following techniques with actual practical training.

The proper fitting of contact lenses involves five major steps: the optical fit, the physical fit, the semi-finished fit, the finished fit, and the chemical fit.

1. In general, the optical fit consists of a refraction of the patient while he is wearing a pair of trial contact lenses.
2. The physical fit includes the making of the eye impressions and preparing the resultant positive casts.
3. The semi-finished fit is comprised of the relief of vascular restriction by the scleral band, the elimination of corneal contacts, and other necessary lens adjustments. Another refraction is made with the patient wearing the semi-finished lenses.
4. The finished fit consists of a final check of the lenses and instruction in the insertion, removal and care of the lenses.
5. The chemical fit is concerned with the choice of an acceptable buffer solution.

THE OPTICAL FIT

Recommended material and equipment:

Refractor, trial frame, spectacle lens trial set, contact lens trial set, rubber suction holder, buffer solution, 1 per cent fluorescein solution, facial tissue, patient's oil silk gown, vertex distance gauge or stenopaic slit and thin steel mm. rule, cobalt blue filter or ultra violet light, cleansing agent.

The patient's visual acuity with and without correction is determined, and the external and internal eye examinations are made. His spectacle correction is then introduced into the refractor and phoria, ductions, accommodative convergence and fusional reserves measured. The

visual skills are then measured and recorded. Finally, ophthalmometer readings are made.

The ophthalmometer readings indicate the trial contact lens corneal radius which is necessary to give corneal clearance. Some ophthalmometers have a corneal radius scale; others have not; all have a dioptric scale. To determine the corneal radius when only the dioptric power is available, the following formula may be used: $r = \frac{1000\ (n - 1)}{F}$, where r denotes the radius of curvature in millimeters, F the dioptric power, and $n = 1.3375$. This latter figure is not the precise index of refraction of the cornea, but an approximate value which brings a correspondence between a reading of 45.00 diopters and a radius of curvature of 7.5 mm.

To determine the trial lens corneal radius which will give clearance, a lens with a corneal radius which is lower in value than the shortest of the corneal radii readings of the principal meridians should be selected. Example:

If the dioptric power of one principal meridian measures 42.00 D and the other 44.00 D, from the above formula we find the radii to be 8.02 mm. and 7.67 mm., respectively. As 7.67 mm. is the lower of the two figures, we would then select a trial contact lens with a corneal radius of 7.5 mm. or lower.

Further consideration may be given the choice of trial lens with the knowledge that a decrease of 0.50 mm. in corneal radius will produce an increase in dioptric power of approximately —3.00 D. Thus, if in the above case a refraction indicated the need of a +3.00 DS when a 7.5 mm. corneal radius was used, the use of a 7.0 mm. corneal radius would negate the use of the added refractive power. It must be remembered, however, that a shorter corneal radius will produce a higher corneal curve which may not be as cosmetically attractive as a lens with a lower curve. Also, the lids will have to tolerate an increased corneal height if a lens with a short corneal radius were used.

According to Southall, the limits of corneal radii are between 7.03 mm. and 8.88 mm. However, in certain pathological conditions, such as keratoconus, the corneal radius may be shorter than 7 mm. In contact lens fitting, experience has shown that in the majority of cases a 7.5 mm. corneal radius and a 12.25 scleral radius will be found satisfactory. On

the whole, the following table has been found acceptable as a first approximation:

In high myopia use an 8.0 mm. corneal curve.

In hypermetropia and low myopia use a 7.5 mm. corneal curve.

In moderate keratoconus and aphakia use a 7.0 mm. corneal curve.

In extreme keratoconus use a 6.5 mm. corneal curve.

After the trial contact lens has been determined, the patient is seated in the chair, a gown is affixed to protect his clothing from the solutions, a towel is placed upon his knees, and he is given a liberal quantity of facial tissue. The following procedures are then fulfilled:

1. The selected trial contact lens is sterilized. If a glass lens, a 70 per cent solution of alcohol is used; if plastic, a solution of polyvinyl alcohol or hexylresorcinol (ST. 37) may be employed. In either case, the lens is finally washed with buffer solution.
2. The suction holder is wetted and then is adhered to the lens so that about twice as much area of the lens is free of the holder in the lower portion as in the upper.
3. Buffer solution, warmed to body temperature, is introduced into the lens, and then 1 drop of 1 per cent fluorescein solution is added.
4. If right handed, the doctor takes his place to the right and facing the patient. The patient is instructed to incline his body and head to an angle of approximately 45° to the floor and direct fixation to his chest.
5. The doctor raises his left forearm over the patient's head, grasps the upper lid margin with his fingers, and retracts it to the supra orbital margin.
6. The patient is now asked to look up and retract his lower lid with his index finger. The lens is inserted under the lower lid. The patient is again told to look at his sheet. The free lens edge is then moved into juxtaposition with the upper portion of the sclera. The upper and lower lids are now released.

Some patients may show an involuntary spastic lid condition which may make lens insertion by the above method difficult. In such cases the following alternate method may be employed:

1. The lens is sterilized and washed.

2. The lens is held in the right hand, grasped between the thumb and middle finger with the index finger under the corneal section. The wide or temporal section of the right lens is adjacent to the thumb, the narrow or nasal section is held by the middle finger. The opposite is true for the left lens.
3. Buffer solution and fluorescein are introduced into the lens.
4. The doctor takes the position as described above. However, the patient is instructed to incline his body and head so that his face is parallel to the floor.
5. The doctor raises his left forearm over the patient's head, grasps the upper lid margin with his fingers, and retracts it to the supra orbital margin.
6. The patient is cautioned to maintain fixation on his chest. The upper edge of the contact lens is inserted under the upper lid and, as the lens is being pushed up, the upper lid is brought down over the lens by the fingers of the left hand until the fingers touch the cheek. With the fingers of the right hand, which are now free, the lower lid is quickly retracted and released, making sure, however, that retraction has freed all lashes from the lower edge of the lens.

After the lenses are inserted, they are inspected under white light. If air bubbles are present in the buffer solution, the lenses are removed and reinserted with fresh solution. The presence of air bubbles is due to either faulty technique, the solution spilling before insertion is accomplished, or a loose scleral band which permits the solution to drain from the lens. Correction of the former comes with constant practice and a realization of the errors made, and of the latter by changing the lens to one with a shorter scleral curve.

Sometimes the scleral band may be so tight as to produce a vascular constriction. Such conditions are easily determined as they present decidedly marked white or bluish areas on the sclera around which the normal flow of the vessels is interrupted. As the lenses are worn only long enough to do trial frame retinoscopic and subjective tests, they need not be changed.

When the solution is seen to be free of air bubbles, the room is darkened and the lenses are examined under a cobalt blue filter or ultraviolet light. If no corneal contacts are present, the fluorescein will reflect a brilliant yellowish-green; if present, the fluorescein will be displaced and a dark area will be seen at the point where the lens rests upon the

cornea. In the latter case, a change to a lens with a shorter corneal radius is indicated.

In many cases, corneal touches will be noticed at the limbus. This is due to the 12 mm. corneal diameters with which trial contact lenses are made. Unless the patient complains of severe discomfort, or a false astigmatism is produced, such touches may be disregarded. If either of the above conditions exist, the lens is replaced with one having a shorter scleral curve, the shorter curve tending to elevate the lens above the limbal area.

Accepting the fit of the trial lenses as satisfactory, they are removed, washed, and reinserted with clear buffer solution. A trial frame is properly positioned on the patient's face and static retinoscopic and distant subjective tests are made. Exacting refinement in these tests is unnecessary as the thickness of the fluid lens, upon which most of the effective power is dependent, may vary with adjustments to the semi-finished lens, thus altering the value of the combined contact and liquid lens power. A second and more precise refraction is made upon the completion of the semi-finished fit.

If the added spectacle lens power is more than four diopters, the vertex distance is measured. The vertex distance is the distance between the front surface of the trial contact lens and the ocular surface of the trial spectacle lens. This distance can be measured with a vertex distance gauge, or by replacing the spectacle lens in the trial frame with a stenopaic slit, and inserting a thin mm. steel rule through the slit until it touches the corneal section of the contact lens.

The first step, or optical fit, is now completed. Our findings are now transferred to a prescription blank, a satisfactory form being reproduced below.

Right Lens	
Trial Contact Lens used	*7.5*
Spectacle Trial Lens	—5.00
Vertex Distance	*16 mm*
Left Lens	
Trial Contact Lens used	*7.5*
Spectacle Trial Lens	—4.50
Vertex Distance	*16 mm*
Size: 20x22, 21x23, 22x24.	

The encircled numbers beside the term "size" refer to the size of the contact lenses which the laboratory is to return. Experience has shown that the larger the lens the more comfortable it will be to the wearer. Of course, certain factors, such as the size of the interpalpebral

fissure and the extent of the fornices will determine the practical lens size limits. It is the author's procedure to have the laboratory return lenses which are made as large as possible to the positive casts of the negative eye impressions. The lens can always be reduced in size, if found necessary.

THE PHYSICAL FIT

It was previously stated that modern molded contact lenses received their impetus from Dallos' discovery of Pollner's Negocoll as an eye impression material. However, although a boon to modern practices, Negocoll possessed many disadvantages, principally in the time consumed in its preparation. It was necessary to liquefy Negocoll by boiling for nearly an hour. It then had to be cooled in a glass beaker, accompanied by constant agitation with a stirring thermometer, until 106° F. had been reached. At this temperature immediate and rapid use was necessary.

Recently, a more suitable molding powder was found. With the new powder only the addition of distilled water and spatulation of the combination is required. The many other advantages offered by this new preparation have now relegated Negocoll to an honorable past as an eye molding material.

Recommended material and equipment:

Table or reclining chair, fixation target, molding powder, distilled water, three rubber bowls (two for molding powder and one for dental stone), two spatulas (one for molding powder and one for dental stone), three pair set of casting shells (small, average, and large), two 10cc wide mouthed graduates, two 10cc cylinder graduates, dental stone, muscle hook, cake of oily base modeling clay, pontocaine ½ per cent, epinephrine H Cl 1:1000.

The factor of the unknown is disquieting to the patient before the mold is taken. To allay his anxiety, he should be told of the procedures employed and their absence of distress.

Instruction in the part he will play is given the patient. He is told that a suitable mold is dependent upon his active cooperation. Knowing this, his efforts to be helpful will usually replace his qualms and result in the successful completion of the operation almost before he realizes that he had nothing to fear. His cooperation is requested since precise attention and response to instructions is of paramount importance.

The molding materials are prepared in proper amounts for spatulation. The recommended amounts of molding powder and distilled water

are measured into their respective graduates, the wide mouthed for the powder, and the cylinder type for the water. The molding powder is then deposited into the two rubber bowls. The procedure is then as follows:

1. The patient is placed in a recumbent position on a table or reclining chair.
2. A fixation target is so placed that upon fixation the lower edge of the iris of the fixating eye is at the lower lid margin.
3. One drop of ½ per cent pontocaine is placed under the lower lid of each eye five minutes before spatulation begins. Two minutes later, one drop of ½ per cent pontocaine is placed under the upper lid of each eye. When spatulation begins, one drop of ½ per cent pontocaine is placed under the lower lid of the eye for which the impression is being made, and a minute later a final drop of ½ per cent pontocaine and one drop of epinephrine hydrochloride (1:1000) are instilled to the same eye. The assistance of a physician is necessary during these procedures.
4. When the third drop of anesthetic has been instilled, the distilled water in one of the cylinder graduates is poured into one of the rubber bowls in which the molding powder has been deposited and spatulation begins. Spatulation should be thorough and for the full time recommended by the manufacturer. Reducing the time of spatulation will not produce a satisfactory negative.
5. The molding mixture is removed from the rubber bowl with the spatula and placed in the casting shell, which is held with the inner canthus mark toward the doctor for the right eye and away from him for the left eye.
6. The doctor takes his place behind the patient. The patient is instructed to look down. The doctor retracts the upper lid to the supra orbital margin with the fingers of his free hand while his assistant grasps the lower lid margin with his index finger, which is covered with gauze to insure traction. The lower lid is not yet retracted.
7. The casting shell is introduced under the upper lid and with an upward pressure against the upper lid the lens is rotated clockwise until the canthus mark is at the inner canthus. The patient is instructed to look at the fixation target. The assistant now retracts

the lower lid and the lower portion of the shell is inserted under the lower lid. The lids and handle of the casting shell are released.

If the molding mixture is spilled over the upper lid so that the doctor cannot be sure that the shell is beneath the upper lid, remove the shell, allow the mixture to set, remove the material, wash the eye and start again. If the shell should fail to get under the lower lid on the first trial, pull back on the handle just enough to allow the assistant to regain traction, again retract and reinsert.

8. The excess molding mixture which has spilled on the lids and cheeks should not be removed until it has set.
9. The patient is not to deviate from the fixation target. If too frequent blinking occurs due to corneal dryness, it may be controlled by mechanical manipulation of the lids by the doctor.
10. The molding mixture will set in approximately three minutes after insertion. Allowing the shell to remain under the lids an additional minute after apparent gel is advisable. The excess material which has spilled on the cheeks, lids, and canthi is removed with the muscle hook and fingers. Note the position of the canthus mark on the shell. If it is not directed toward the canthus, draw a substitute mark with the red marking pencil.
11. The patient is instructed to look down and the upper lashes are freed from the gel at the shell. The patient is then told to look up toward the doctor as far as possible. The handle of the shell is grasped between the thumb and index finger and directed toward the brow, while the lower lid is retracted with the middle finger. With the rounded angle of the muscle hook, the lower lid margin is pressed back so that the lower edge of the shell is free from the lid. The shell is then gently raised from the sclera at the lower lid. Sometimes slight rotation of the shell handle will aid in breaking the suction.
12. The patient is instructed to look down and the shell is simultaneously removed by movement away and out from under the upper lid.
13. The eye is irrigated and any remaining particles removed, with especial attention given to the fornices.
14. The same technique is employed in making the impression of the left eye. Two drops of ½ per cent pontocaine and one of epinephrine are administered to the left eye before the shell is inserted. None is necessary for the right eye.
15. After the impressions are made, the installation of one drop of epine-

phrine to each eye will reduce the edema.

16. After each shell is removed, it should immediately be immersed into a fixing solution to reduce any chance of drying and shrinkage.

This completes the first part of the physical fit. A good fitting lens is dependent upon a properly prepared negative impression. The additional time spent in obtaining such an impression will be regained many times over in the fewer adjustments which will be necessary in fitting the semi-finished lenses.

The second part of the physical fit is concerned with the preparation of the positive casts of the negative eye impressions. The procedures used follow:

1. The shells are removed from the fixing solution and hospital cotton is used to absorb the excess solution in the mold.
2. About two cc of water is poured into a rubber bowl (used for this purpose exclusively), and dental stone is added until the stone absorbs the water. More stone is added and the mixture spatulated until a thick but flowing compound is attained.
3. The bowl is tapped to release air bubbles.
4. The dental stone mixture is scooped up with the spatula and poured into the mold from the side, care taken that the spatula does not strike the mold or shell. Fill the mold to capacity.
5. Allow the stone to set for about one-half hour.
6. With a pencil or sharp pointed instrument a line is drawn from the inner to the outer canthus. Then, holding the shell as if it had been removed from his own eye, the doctor inscribes, in the center and above the line, an R for the right eye and an L for the left eye; an N denoting the nasal sides and a T the temporal sides. Below the line the patient's name is inscribed.
7. After the stone has fully set, which will be in about one hour, it is removed from the mold.

Before sending the completed Rx form and casts to the laboratory, it is wise to prepare a duplicate pair of positive casts as insurance against possible loss or destruction of the originals in transit. The preparation of the duplicates is made as follows:

1. A bar of an oily base modeling clay is formed, wide and thick enough to accept both casts.

2. The casts are placed in water long enough to wet the surfaces thoroughly.
3. The casts are carefully impressed into the clay.
4. The clay is notched at the canthus marks and indication made as to eye, nasal and temporal sides.
5. The casts are grasped at opposite sides with two sharp pointed instruments and carefully raised from the clay.
6. Dental stone is prepared and poured into the cavities.
7. After the expiration of one-half hour the canthus lines are drawn and the casts properly inscribed.
8. In another one-half hour the casts are removed from the clay and filed.

THE SEMI-FINISHED FIT

The advent of molded plastic contact lenses introduced a means of adjusting such lenses to the human eye when relief because of excessive size, scleral tightness, edge looseness, or corneal touches was necessary. At first, adjustments were made with no definite plan of procedure, and many hours were lost because of faulty and haphazard technique. Recently, however, more positive methods of adjustments and rules for their application have been evolved. The diligent employment of these methods and rules gives assurance of a proper and efficient fit.

A properly fitted contact lens is one which rests evenly and without undue pressure on the sclera, and arches over the limbus and cornea. There should be no tight areas, evidenced by vascular restrictions and blanching, nor scleral looseness, which tends to cause corneal contacts. These conditions are true both in direct fixation and in extreme rotation in the cardinal directions.

Recommended materials and equipment:

Dental lathe, small carborundum stone, grit impregnated rubber tip, dental mandril, felt polishing discs, bar of dental polishing compound, alcohol lamp, wax spatula, dental trimmer.

The carborundum stone, which comes mounted, and the grit impregnated rubber tip, which must be mounted on a mandril, are used to reduce stock; the felt discs and polishing compound are used to polish the areas which have been scratched by the carborundum stone and rubber tip; the alcohol lamp is used to heat the wax spatula when it is

necessary to tighten loose edges; the dental trimmer is used to reduce the lens in size.

In relieving tightness, the areas which are to be given relief are carefully marked with the red pencil. The lens is removed and the marked areas are encircled. The carborundum stone is inserted in the handpiece of the dental lathe, and, permitting the weight of the stone alone to do the grinding, the stone is rotated in short circles within the area to be relieved. Very often the removal of 1/10 mm. of stock will give the necessary relief. Experience will indicate the needed extent for correction.

After the stone has been used, it is replaced by the grit impregnated rubber tip and used in the same manner. The stone roughens the surface of the lens so as to make polishing difficult. The rubber tip decreases the grain, permitting a better polish. The polish is attained by the use of the felt disc which is first run over the bar of polishing compound, and then over the areas which had been ground. Care must be taken with the felt disc as the friction of sustained use may generate sufficient heat to warp the surfaces upon which the disc is being employed. As with the stone and rubber tip, the weight of the felt disc should be allowed to do the polishing as it is moved constantly over the area to be polished. Any remaining compound is easily removed from the lens with facial tissue.

Edge looseness is a condition in which the edge of the lens is elevated from the sclera. Such cases are often associated with a complaint of discomfort, introduced by the need for the lids to accommodate a mechanical irritant.

Before adjustments can be made to correct for edge looseness, it is first necessary to prepare a positive dental stone cast of the lens. It is expedient to make routine the preparation of casts of both lenses upon the return of the lenses from the laboratory.

After the area of looseness has been determined and marked, the lens is placed upon the stone cast and its comparable area is encircled. With a sharp knife, the pre-determined amount of stone stock, to render correction, is removed. This area is then smoothed with fine sandpaper. The red pencil marks are removed from the lens and the lens is replaced upon the stone cast. (Failure to erase the red pencil marks will result in the marks becoming permanently baked to the lens after the use of the hot wax spatula.)

The wax spatula is heated by the flame of the alcohol lamp. The

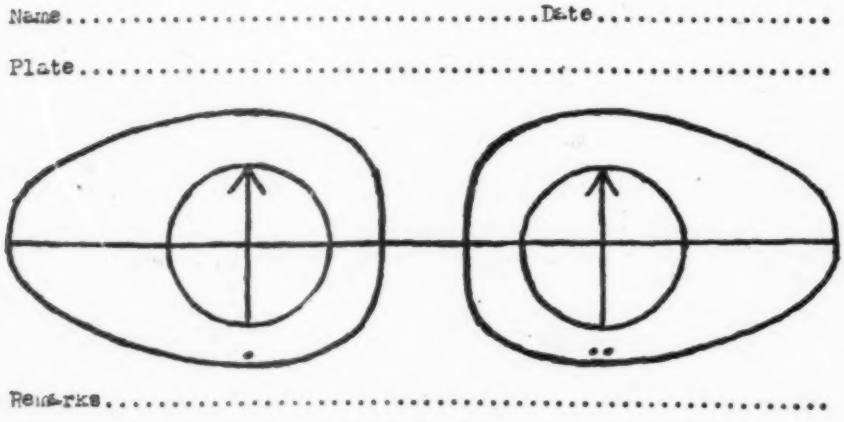
spatula is sufficiently hot for use when it barely singes a sheet of facial tissue.

Holding the lens and stone cast firmly, the spatula is placed upon the lens, and, with gentle pressure, it is rocked in short strokes. The spatula is not to be removed from the lens until it has cooled, as removal while still hot will corrugate the edge of the lens. Care must be taken that the hot spatula does not touch the corneal section.

When reduction in lens size is necessary, the trimmer is used. After the area to be removed is marked, the trimmer is affixed to the lathe and employed with smooth, constant motion over the lens edge. Sharp edges may be smoothed by the use of the carborundum stone. Polishing is accomplished by the use of adjoining felt polishing discs attached to a mandril. The adjoining discs offer a groove between the discs in which the lens edge may be polished after, of course, the discs have first been impressed in the polishing compound.

The routine attending the semi-finished fit is a definite one. The following steps are in sequence and their successive employment is necessary if efficiency is valued.

1. Prepare a working diagram such as shown in figure 1. Such diagrams will act both as reports of progress and permanent records.



Braff, Figure 1

2. Check the lens for rotation:
   a. Draw a horizontal line from the outer to the inner canthus with

a red China marking pencil, Blaisdell 165T, and a vertical line which bisects the corneal section.

b. Insert the lens either with or without solution. Sometimes the lens may be too large for insertion. In such cases, the lens is reduced in size from the upper nasal margin to the temporal edge (or from 2 o'clock to 9 o'clock for the right lens and from 3 o'clock to 10 o'clock for the left lens).

c. The patient is instructed to look first temporally, and then upward. If the nasal and lower edges of the lenses cannot be seen, then the lens is reduced from 2 to 9 o'clock for the right eye, and 10 to 3 o'clock for the left eye. Clearance of the caruncle and semilunar membrane is essential.

d. The patient is instructed to look nasally. If the temporal edge of the lens is imbedded in the outer fornix, the area of interference is marked and trimmed.

3. Check for rotation:

Rotation of the lens is seen as a deviation of the red horizontal line from its normal position. Rotation is due either to tightness of the scleral band or looseness at the edges. The correction of rotation, therefore, evolves itself into the relief of the tight areas and the tightening of loose edges. Before marking the offending areas it is first necessary to turn the lens, either with the fingers or a suction holder, to its correct position on the eye. No advance in procedure should be made until the lens maintains a proper and stable position.

4. Check for tight areas:

a. The optical center of the lens is marked with the red pencil.

b. The lens is inserted with or without solution.

c. If tightness is present, it is observed as areas of blanching, either white or blue in appearance. These areas are marked with the red pencil by short, straight lines.

d. Rules for relieving tight areas:

1. If there is tightness both nasally and temporally, relief is first given to the temporal tightness, thus permitting the lens to shift nasally. However, if the optical center of the lens is on the nasal side of the pupil center, relief is first given to the nasal tightness, thus permitting the lens to shift temporally

to bring about a coincidence between the optical center of the lens and the pupil center.

2. If there is tightness both in the upper and lower portions of the lens relief is first given to the lower portion, thus permitting the lens to shift upward. However, if the optical center of the lens is above the pupil center, relief is first given to the upper portion, thus permitting the lens to shift downward to bring about a coincidence between the optical center of the lens and the pupil center.
3. Individual tight areas are relieved in the prescribed manner.

5. Check for loose areas:

Looseness, indicated by the infiltration of fluorescein into the loose areas, tends to cause corneal contacts. Being loose, the lens, rather than following the movement of the eye, lags behind, permitting the lens to touch the cornea.

When corneal contacts due to looseness are present, it becomes necessary to remove the cause. This is accomplished by grinding the areas surrounding the fluorescein pools, allowing the lens to settle back. Repeated adjustments may be necessary before the pools are eliminated.

Occasionally, no pools of fluorescein appear but a corneal contact is present. If the lens is moved with the pencil away from the area of contact, an infiltration of fluorescein in this area may be observed. This area of infiltration is marked and its surrounding area ground until the corneal contact is relieved.

If a corneal contact is present without the presence of pools or infiltrations, the inner corneal diameter may be assumed to be too small. This condition may sometimes be relieved by the careful grinding of the inner junction of the corneal and scleral sections. If this procedure proves unsuccessful, it then becomes necessary to determine the corneal diameter which will give clearance and return the lenses to the laboratory, with proper instructions.

6. The second refraction:

After all necessary adjustments are made and the lenses have assumed a satisfactory physical fit, a second and more complete refraction is made.

At the time of the optical fit a preliminary refraction was made. The findings at that time indicated the general binocular responses and an estimate of the refractive correction. More definite testing was unnecessary

as adjustments to the lenses during the semi-finished fit very often changed the thickness of the buffer solution, resulting in a change of the refractive power of the combined system. Now that the lenses fit properly, and the liquid lenses have assumed stable proportions, a more detailed analysis can be made.

It is as important to determine the proper refractive needs in fitting contact lenses as it is with spectacle lenses. Thus, with the patient wearing his contact lenses, a complete routine refraction and analysis is made. As with spectacle lenses, both prismatic and cylindrical power can be incorporated into contact lenses.

When the added refractive power has been determined, the finished lens prescription form is completed and returned with the lenses to the laboratory.

SEMI-FINISHED LENS REPORT

Right Lens	
Added power needed	—0.50 Diopters
Corneal fit	O.K.
Scleral fit	O.K.
Remarks	None
Left Lens	
Added power needed	—0.75 Diopters
Corneal fit	O.K.
Scleral fit	O.K.
Remarks	None

THE FINISHED FIT

The finished fit is concerned with a final check of the lenses and instruction to the patient in the insertion, removal and care of the lenses.

Although all adjustments for size, rotation, tightness and looseness were made at the time of the semi-finished fit, infrequently minor irregularities, such as isolated areas of tightness, may appear. These are cared for in the proper manner.

The insertion and removal of contact lenses are relatively simple procedures, but to the patient they may represent almost insurmountable obstacles. To allay their misguided concepts, a practical self-demonstration should be made by the doctor.

There are many methods of inserting contact lenses under the lids and individual preferences differ. Two of these methods are offered.

Method 1:

a. The buffer solution is warmed to near body temperature by holding the ½ oz. dropper bottle, in which the patient carries solution, in the palm of the hand. (A cold solution may cause a slight shock upon touching the cornea.)

to bring about a coincidence between the optical center of the lens and the pupil center.

2. If there is tightness both in the upper and lower portions of the lens relief is first given to the lower portion, thus permitting the lens to shift upward. However, if the optical center of the lens is above the pupil center, relief is first given to the upper portion, thus permitting the lens to shift downward to bring about a coincidence between the optical center of the lens and the pupil center.
3. Individual tight areas are relieved in the prescribed manner.

5. Check for loose areas:

Looseness, indicated by the infiltration of fluorescein into the loose areas, tends to cause corneal contacts. Being loose, the lens, rather than following the movement of the eye, lags behind, permitting the lens to touch the cornea.

When corneal contacts due to looseness are present, it becomes necessary to remove the cause. This is accomplished by grinding the areas surrounding the fluorescein pools, allowing the lens to settle back. Repeated adjustments may be necessary before the pools are eliminated.

Occasionally, no pools of fluorescein appear but a corneal contact is present. If the lens is moved with the pencil away from the area of contact, an infiltration of fluorescein in this area may be observed. This area of infiltration is marked and its surrounding area ground until the corneal contact is relieved.

If a corneal contact is present without the presence of pools or infiltrations, the inner corneal diameter may be assumed to be too small. This condition may sometimes be relieved by the careful grinding of the inner junction of the corneal and scleral sections. If this procedure proves unsuccessful, it then becomes necessary to determine the corneal diameter which will give clearance and return the lenses to the laboratory, with proper instructions.

6. The second refraction:

After all necessary adjustments are made and the lenses have assumed a satisfactory physical fit, a second and more complete refraction is made.

At the time of the optical fit a preliminary refraction was made. The findings at that time indicated the general binocular responses and an estimate of the refractive correction. More definite testing was unnecessary

as adjustments to the lenses during the semi-finished fit very often changed the thickness of the buffer solution, resulting in a change of the refractive power of the combined system. Now that the lenses fit properly, and the liquid lenses have assumed stable proportions, a more detailed analysis can be made.

It is as important to determine the proper refractive needs in fitting contact lenses as it is with spectacle lenses. Thus, with the patient wearing his contact lenses, a complete routine refraction and analysis is made. As with spectacle lenses, both prismatic and cylindrical power can be incorporated into contact lenses.

When the added refractive power has been determined, the finished lens prescription form is completed and returned with the lenses to the laboratory.

SEMI-FINISHED LENS REPORT

Right Lens	
Added power needed	—*0.50* Diopters
Corneal fit	*O.K.*
Scleral fit	*O.K.*
Remarks	*None*
Left Lens	
Added power needed	—*0.75* Diopters
Corneal fit	*O.K.*
Scleral fit	*O.K.*
Remarks	*None*

THE FINISHED FIT

The finished fit is concerned with a final check of the lenses and instruction to the patient in the insertion, removal and care of the lenses.

Although all adjustments for size, rotation, tightness and looseness were made at the time of the semi-finished fit, infrequently minor irregularities, such as isolated areas of tightness, may appear. These are cared for in the proper manner.

The insertion and removal of contact lenses are relatively simple procedures, but to the patient they may represent almost insurmountable obstacles. To allay their misguided concepts, a practical self-demonstration should be made by the doctor.

There are many methods of inserting contact lenses under the lids and individual preferences differ. Two of these methods are offered.

Method 1:

a. The buffer solution is warmed to near body temperature by holding the ½ oz. dropper bottle, in which the patient carries solution, in the palm of the hand. (A cold solution may cause a slight shock upon touching the cornea.)

b. The lens is held between the thumb and middle finger with the index finger under the corneal section. The wide or temporal section of the right lens is adjacent to the thumb; that of the left lens is adjacent to the middle finger when the right hand is used in inserting both lenses.

c. The lens is filled with solution.

d. The body is bent at the waist with the head parallel to the floor.

e. Fixation is directed at the chest and the upper lid is retracted.

f. The upper edge of the lens is inserted under the upper lid and, as the lens is pushed up, the upper lid is brought down until the fingers touch the cheek.

g. Fixation is now directed at the shoes. With the fingers of the right hand, which is now free, the lower lid is quickly retracted and released.

Method 2:

a. The suction holder is adhered to the lens so that about twice as much area of the lens is free of the holder in the upper portion as in the lower.

b. The lens is filled with solution.

c. Bending at the waist the head is inclined so as to be parallel to the floor, and fixation directed at the chest.

d. The upper edge of the lens is inserted under the upper lid and pushed upward.

e. The upper lid is released.

f. Fixation is directed at the shoes.

g. The lower lid is retracted and released.

h. The suction holder is squeezed and removed sideways.

As with insertion, there are also numerous methods for removal of the lenses. Three are offered, two with use of the suction holder, the third accomplished with the fingers. It is suggested that one of each method be taught patients, as the loss of the suction holder while the lenses are worn might make for a difficult situation.

Method 1:

a. The suction holder is wetted and squeezed.

b. With the index and second fingers of the free hand the lid margins are grasped and parted.

c. With fixation upon the hole in the suction holder, the holder is brought to the lens and adhered to the corneal section.

d. The suction holder is released and allowed to suspend, making sure that it is firmly attached to the lens.

e. The holder is again grasped and fixation directed to the chest.

f. The upper lid is retracted and the upper portion of the lens released from the sclera sufficiently to clear the lid. When it is difficult to break the suction, rotation of the lens, associated with gentle pressure down and out, usually succeeds.

Method 2:

The procedures for this method are the same as those in Method 1 except that the lens is first removed from beneath the lower lid while fixation is up. The lens is removed from beneath the upper lid with a simultaneous movement of the eye down and the lens out and down.

Method 3:

1. If the right lens is to be removed, fixation is directed to the left.
2. The right thumb nail is placed on the temporal section of the lens and moved toward the edge until the thumb nail drops to the sclera and under the lens.
3. The lens is raised slightly from the sclera and grasped at the outer edge by the index finger.
4. The lens is removed by a simultaneous movement of the eye to the right and the lens out and temporally.
5. The procedure for the removal of the left lens is the same.

The patient is given the following instructions in the use and care of the lenses.

1. The tears act as a moistening and lubricating agent to the cornea and are distributed by the lids in blinking. When contact lenses are worn, the solution within the lenses replaces the tears in the above capacities and, very often, the blinking stops. When this occurs, the front surfaces of the lenses dry, producing a visual haze. As it is difficult to make blinking a forced habit, patients are instructed to keep their lenses in water, when not in use, for the first few weeks. This will give the lenses an affinity to wetness.
2. The lenses are to be kept clean at all times. Before insertion, they are to be cleansed and then washed with buffer solution. After removal, they are again washed with buffer solution and dried with facial tissue.

3. Tolerance must be gained for contact lenses. A properly fitting lens will produce no physical discomfort, but these foreign bodies must be accepted by the eyes and lids. Such acceptance varies with individuals. Some may be able to wear their lenses comfortably for long periods of time immediately after receiving them; others may realize a myriad of symptoms even though the lenses fit well. A discussion of the more common complaints and means for their correction will be discussed later under contact lens symptomology.

Controlled and early limited use of the lenses aids in gaining tolerance. The patient should be instructed to wear his lenses for 1 to 1½ hours each day the first week; for 2 to 2½ hours each day the second week; 3 to 3½ hours each day the third week; and as long as possible the fourth week.

At the end of the fourth week the patient is to return for a progress report and brings with him a daily schedule, recording the time of insertion, time of removal, symptoms, and remarks. This schedule is an invaluable aid in analysing possible causes for distress and proper action for their alleviation.

THE CHEMICAL FIT

The chemical fit is concerned with the choice of an acceptable buffer solution.

Much time has been spent in research and study of this problem. Many solutions have been tried. Some have been accepted with comfort by one group of patients but not by another. Many theories as to the reasons for non-acceptability have also been evolved. Some are profound and others benighted.

The more expedient of these suppositions, at the present time, are those concerning the osmotic pressure, the hydrogen ion concentration, and the chemical composition of solutions.

A solution may be hypertonic, hypotonic or isotonic. It is hypertonic when the osmotic pressure of the solution is higher than that of the corneal tissue cells, permitting a flow from the cells into the solution and causing a dehydration of the cells; it is hypotonic when the osmotic pressure of the solution is lower than that of the corneal tissue cells, permitting a flow from the solution into the cells and causing a swelling of the cells; it is isotonic when both the solution and fluid within the cells possess the same osmotic pressure, with no flow taking place in either direction.

Although we have all the above information, it does us little good

as there is no available information on the osmotic pressure of the corneal tissue fluids. Thus, if we feel that the osmotic pressure of a solution is too high, we may lower it by the addition of distilled water, and, if too low, by the addition of chemical concentrate.

The hydrogen ion concentration, or pH value, is the measure of the degree of acidity or alkalinity of a solution.

The extent of the pH scale is from one to fourteen. One to seven is acid. Seven is neutral, being neither acid nor alkaline. Eight to fourteen is alkaline. The greatest success has been had with those solutions on the alkaline side of the scale, from 8.0 to 8.8.

Unlike alterations in osmotic pressure, it is difficult to change the pH value of buffer solution. The addition of small amounts of distilled water and/or acid or alkaline solutions will not alter the pH of a buffer solution.

At present, the most satisfactory of solutions is that of sodium bicarbonate. Solutions composed of 15 to 25 grains of sodium bicarbonate in 2 oz. of distilled water have been found to be comfortable in the majority of cases, with greatest acceptance of an 18 grain solution.

CONTACT LENS SYMPTOMOLOGY

The asthenopic symptoms associated with the wearing of contact lenses are numerous. The more common of these symptoms of ocular distress and their corrective measures are:

a. A complaint of seeing through a haze or fog. The haze caused by lens drying has been referred to in a previous chapter.
   Another form of haze or fog is that produced by the discharge of oily secretions from the lids into the solution. Early restricted use of the lenses brings about a tolerance for the lenses by the lids and the cessation of the discharge.
   A final form of haze is that which is corneal. This haze is said to be due to an infiltration of solution into the corneal tissue. Very often this condition can be remedied by increasing the osmotic pressure of the solution or by a change of solution.

b. A complaint of seeing rainbow effects around artificial lights. This condition is associated with the corneal haze and correction is the same.

c. A complaint of photophobia. The two most common theories for this condition are overcorrection in myopia and the dispersion of light by the buffer solution. Relief of the former can be achieved

by the addition of plus power to the refractive correction, and to the latter by a change in solution.

d. Complaints of burning, excessive lacrimation and conjunctival injection. These symptoms have been grouped together as they all appear to be associated with the choice of buffer solution. Changes in the osmotic pressure and chemical composition of the solution will often bring relief.

e. A complaint of seeing through water. This condition will overcome itself after the lenses have been worn for a day or two.

The author does not accept credit for complete originality of the procedures advocated in this paper. Credit should, in the main, go to those contemporaries, Mr. Theo. E. Obrig and Mr. Philip L. Salvatori of the Obrig Laboratories, Inc., who have done much fine work in the molding technique.

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NOTES ON AN EVALUATION OF DRIVER SELECTION DATA*

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THE PROBLEM

The problem of selecting drivers for the operation of commercial vehicles has increased in importance in the last few years. The armed services must select large numbers of men to operate unfamiliar vehicles. Commercial organizations must secure many replacements for men who have been drafted.

Many supervisors are confronted with the very practical problem of making a selection, though ofttimes limited, among prospective drivers that are available. Frequently, the persons who must make the selection have had only limited experience in this field. These people are likely to be confused by the numerous tests and procedures which may be used for selecting safe and skillful drivers.

If there were available a good criterion of safe and skillful driving, then it would not be difficult to administer a comprehensive battery of tests and by statistical means select those tests and data which correlated most highly with a man's ability to drive. At present there is very little data of this type available which would enable one to say that a given test should be given twice as much weight as another. In spite of this, drivers are going to be employed on one basis or another.

METHOD OF EVALUATION

Lacking statistical data the next most reasonable method of evaluating tests seems to be to obtain a composite judgment of men who have had the most experience in selecting drivers or in analyzing driver research data. It is admitted that this method of evaluation should be discarded when a more scientific method based on factual analyses is available. It is believed that the information in this report will be of value, particularly to those employers who have limited experience in driver selection.

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For half of the persons making ratings the items to be rated were listed in reverse order to reduce the effect of position on the rating received. Each rater was asked to assume that the tests and data available were about as reliable as could be normally expected. He was asked first to assign a percentage weight to five major groups of tests and data on the assumption that these data were available for use in the selection of commercial drivers. After this was done the rater was asked to rank each of the subtests in what he considered their order of importance. The value of the tests as a means of education was not considered. The lists were first sent to persons known to be quite active in this field. These persons were in turn asked to suggest others whose judgment would be valuable. This report includes 35 ratings. Very few of the persons written failed to rate the items.

The first step in this analysis was the determination of the average weight assigned to each of the five major groups of data. These groups consisted of, (1) Road tests, (2) Psychophysical tests, (3) Skill tests, (4) Experience, and (5) Written tests. Among those who rated these groups, the road test was considered the most important and in their opinion should be given twice as much weight as the other individual groups of data. The replies indicated no substantial difference in the weights assigned to the other four groups of data.

PSYCHOLOGICAL TESTS

A list of 11 psychophysical tests frequently used was submitted with the request that each be ranked in order of its importance. The average rankings are given in Table I.

TABLE I

Mean Rankings of Psychophysical Traits

Test	Mean Ranking*	S. D. of the Distribution
Visual Acuity	3.3	2.9
Distance Judgment	4.3	2.1
Reaction Time	4.7	2.6
Muscular Coordination	5.0	2.8
Night Vision	5.2	2.7
Field of Vision	5.2	2.4
Glare Vision	7.0	1.9
Steadiness	7.1	2.8
Color Vision	7.1	2.9
Hearing	7.2	2.9
Eye Dominance	9.2	2.7

*The most preferred tests are listed first.

It is apparent that visual acuity is considered the most important single trait. It is probably also the test most frequently used. Distance judgment, reaction time, muscular coordination, night vision and field

of vision were rated next in importance. There was no significant difference in the ratings given those five tests. Rated as the next most important were glare vision, steadiness, color vision and hearing. These four tests were rated substantially lower than those previously mentioned.

DRIVING SKILL TESTS

Six driving skill tests were rated. These included tests of driving which could be performed in restricted areas. Differences in average ratings of the six tests were not large.

TABLE II

Mean Rankings of Driving Skill Tests

Test	Mean Ranking	S. D. of the Distribution
1. Parking parallel	3.0	1.8
2. Turning car around in a narrow street	3.3	1.7
3. Making an emergency stop	3.3	2.1
4. Weaving between stanchions	3.6	1.4
5. Stopping with bumpers and wheels at a given point	3.6	1.4
6. Driving forward and backward on a straight line	4.0	1.6

EXPERIENCE

Three phases of experience as obtained from the applicant by interview or questionnaire were rated. The accident record was generally considered to be the most important.

TABLE III

Mean Rankings of Various Types of Experience

Type of Experience	Mean Ranking	S. D. of the Distribution
1. Accident record	1.3	.6
2. Experience with various type of vehicles	2.2	.8
3. Miles driven	2.4	.6

WRITTEN TESTS

Written tests were rated as furnishing the least useful information in the selection of commercial drivers. Knowledge of Sound Driving Practices, General Intelligence and Knowledge of Traffic Regulations were considered of major importance. The meaning of Road Signs was given a weak fourth place and Knowledge of Automobile Mechanics was definitely ranked in fifth position. Detailed rankings are given in Table IV.

TABLE IV

Mean Rankings of Written Knowledge Tests

Tests	Mean Ranking	S. D. of the Distribution
Sound Driving Practices	1.9	.9
General Intelligence	2.2	1.0
Traffic Regulations	2.5	.9
Meaning of Road Signs	4.0	.8
Automobile Mechanics	4.4	.8

WEIGHTINGS ASSIGNED BY INSURANCE ENGINEERS

A slightly modified questionnaire was distributed by G. H. Perry, President of the Insurance Engineers, handling fleets in the Boston Area. The items were rated by 28 insurance men with industrial or commercial fleet experience. The ratings given by these insurance men are summarized below for comparison with the data previously mentioned:

TABLE V

Weights Assigned to Major Groups of Data

Road Test	33%	Skill Tests	12%
Psychophysical Tests	14%	Written Tests	9%
Driver attitude	13%	Moral Hazard	7%
Experience	12%		

TABLE VI

Mean Rankings of Psychophysical Tests			
Visual Acuity	2.2	Muscular Coordination	6.2
Distance Judgment	3.9	Steadiness	6.5
Reaction Time	4.5	Glare Vision	6.7
Night Vision	4.7	Color Vision	8.1
Field of Vision	5.9	Eye Dominance	8.1
		Hearing	8.6

TABLE VII

Mean Rankings of Skill Tests

Parallel Parking	2.7	Stopping with bumpers and wheels at a given point	4.2
Turning car around in a narrow street	3.0	Driving forward and backward on a straight line	4.6
Weaving between stanchions	3.2		
Making an emergency stop	3.3		

TABLE VIII

Mean Rankings of Written Tests			
General Intelligence	1.7	Traffic Regulations	2.7
Sound Driving Practices	1.8	Meaning of Road Signs	4.1
		Automobile Mechanics	4.7

TABLE IX

Mean Rankings of Various Types of Experience

Accident Record	1.6	of Vehicles	2.1
Experience with Various Types		Miles Driven	2.3

USE OF DRIVER SELECTION DATA

The above ratings should be used only as a general guide for the selection of commercial vehicle drivers. There are so many variables that no hard and fast rules can be substituted for common sense. A man may rate high on every item above but steal the company's property. Naturally he could not be hired. A salesman-driver might be a good driver but so antagonize the customers that the company could not afford to hire him. A single serious deficiency might eliminate a man thoroughly qualified in every other way. An example of this would be the man subject to heart attacks. The person with very poor night vision might be a very good driver during the day but could not be trusted to drive at night. For jobs

involving only daytime driving, a night vision test would be of little importance.

The value of a test is also dependent upon the reliability of the score obtained. Five or ten questions on traffic regulations will tell very little about the individual's knowledge of the regulations. Similarly, only three trials on a reaction time test will give practically no indication of the man's average reaction time. Where experienced drivers are tested, care must be taken not to eliminate a safe driver. Through experience many persons learn to compensate for deficiencies they have had for a number of years. Any blind person can get around much better than a normal person who has been blindfolded. A combination of two deficiencies might be much more serious than the single addition of the two. Poor distance judgment and slow reaction time would certainly invite rear end collisions. It is the "pattern" of test scores that is really important.

For most tests the point at which a deficiency becomes a hazard is not known. A person may fail to distinguish between certain shades of green and red and yet have little trouble in distinguishing between the red and blue-green as used in a traffic signal.

Tests, of course, have other uses than for driver selection. They point out unknown defects which may be corrected and they bring to the attention of the driver the many factors involved in driving. In any driver selection program the pattern of the driver's qualifications must be matched with the pattern or requirements of the job. There always will be factors such as attitude, emotional stability, ambition and social background which must be taken into consideration, but which cannot be expressed in quantitative terms.

In order to get a better picture of a man's qualifications, a profile chart which includes all the data available is recommended. The first step in the preparation of such a chart involves the expression of all scores on a comparable basis. This may be done by converting each score to a letter grade of A, B, C, D or E. The following example will illustrate how this may be done. Suppose that 200 men have taken a written test on their knowledge of traffic regulations. First arrange all these scores from the best to the poorest and give letter grades as follows:

A for the best . . . . . 6% (12 papers)
B for the next best 25%
C for the middle 38%
D for the next 25%
E for the poorest 6%

The "B" papers might be found to range from 87% to 93%. Once the scale is established, new men can be rated as they are tested. If only a few drivers are available for setting up a preliminary scale, then the scale should be revised after 100 or 200 men have been tested. Since raw scores in themselves mean very little, all quantitative data used in selection should be reduced to this 5-letter scale. After all data have been converted to letter grades, a profile chart should be made similar to the following example. (Only a few sample tests are given below.)

SAMPLE PROFILE CHART

Data	Raw Score	Letter Grade				
Road Test with Truck	23 errors	A	B	C	D	(E)
Visual Acuity (Right Eye)	100%	A	B	(C)	D	E
Visual Acuity (Left Eye)	120%	A	(B)	C	D	E
Reaction Time (Foot)	.33 seconds	A	(B)	C	D	E
Parallel Parking	6 errors	A	B	C	(D)	E
Knowledge of Traffic Regulations	87%	A	(B)	C	D	E
Truck Driving Experience	1 month	A	B	C	D	(E)

This procedure gives a quick picture of the man's qualifications. Ordinarily more data than the above would be available but the above will serve as an illustration. With this meager data it is apparent that the man is not now qualified to drive a truck. However, his vision, reaction time and knowledge of traffic regulations are passing. The poor score on the road test would appear to be due largely to inexperience. In this instance it would appear that this man was worthy of training (unless better qualified men are immediately available). After a period of training this man should be given another road test to determine finally whether or not he should be permanently employed. As another example, a man might rate well in nearly everything but have very poor vision in one eye. He should be thoroughly checked by an eye specialist since glasses may bring his vision up to normal. If the vision cannot be improved then it may be advisable to select some other prospective candidate. However, if this man has already driven for several years without accident, he may have learned to compensate for the deficiency. The rankings given in this report should serve as a guide in evaluating the driver selection data available.

SUMMARY

Since research data are not available to properly evaluate the various types of information used for selecting drivers, a questionnaire was mailed to those persons known to have considerable experience in the training and selection of drivers. Five groups of tests or information were submitted. The average weight assigned to each is indicated below:

Road Test 32%

Psychophysical Tests	19%
Skill Tests	18%
Experience	16%
Written Tests	15%

It is quite evident that the road test was considered of prime importance. Differences between the other groups of data were insignificant.

Of the psychophysical tests, Visual Acuity was easily put in first place followed by Distance Judgment, Reaction Time, Muscular Coordination, Night Vision and Field of Vision.

Of the special driving skill tests, Parking Parallel was considered the most important followed by Turning Car Around and Making an Emergency Stop.

The Accident Record was considered more important than either the Experience With Various Vehicles or the Mileage Previously Driven.

Of five types of information available through written tests, Knowledge of Sound Driving Practices was considered of most importance. This was followed by General Intelligence and Knowledge of Traffic Regulations. Ranking considerably lower were Meanings of Road Signs and Automobile Mechanics.

The evaluation of driver selection data given by experienced individuals in the field should serve as a helpful guide for the personnel manager confronted with the problem of selecting commercial vehicle drivers.

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BIOMETRIC REFRACTION*

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Every student of visual optics devotes a considerable time to the consideration of the classical schematic and reduced eyes of Listing, Helmholtz, Donders, Tscherning and Gullstrand. We owe a considerable debt to the work of J. K. F. Gauss of Göttingen which gives workable mathematical expression to the operation of light within complex optical systems, but it is largely owing to J. B. Listing that the idealized conception of a purely hypothetical eye has its place in optical textbooks. When one inspects the various values given to the elements of the ocular system by Listing and those who have followed him it is clearly seen that these values are dictated by somewhat rigid theoretical assumptions. Truly they have their ultimate basis upon a selected series of measurements but if the average results are considered it is obvious that they cannot be applied to specific examples of emmetropic eyes. In our ordinary work we tend to forget the words of the late H. L. Taylor—"A schematic eye is merely a model for comparison. A reduced eye is one simplified for the purpose of calculation." We have to use them when we wish to study the application of optical principles to the elucidation of many of our ocular refractive problems, but their value ceases there and it is probable that the actual human eye itself has little resemblance to them.

That the above considerations have some considerable degree of justification has long been thought likely by many well-known ophthalmologists, and if the dimensions of the schematic and reduced eyes had any practical significance in clinical work there is little doubt that such questionings would have produced some more valuable conclusions with respect to them. The simple fact that they are of academic interest and utility alone has saved them. When we come to study individual eyes we find that it is not possible to remain content with these theoretical assumptions and the more refined we make our tests and measurements the more do we see that each individual eye indicates in and of itself the more perfect form to which it approximates. The eye is not fundamentally an optical system but a biological product which has survived

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because it subserves a specific function. It is a part of a living system which continues to exist because during its evolution it has adapted itself to its environment. It is conceivable to imagine a world in which mankind completely lacked sight and yet in which some other sense had taken its place.

Because the eye is not a product exhibiting mathematical exactitude but the result of a biological process it is obvious that it must show certain aberrations of development when compared with the eye of mathematical theory. When such aberrations obtrude themselves into the sphere of usefulness we have ametropia and those other faults which we recognize as common to all optical systems. Thus astigmatism can be the product of a mal-position of the optical elements about the optic axis, a slight tilt of the crystalline lens has been recognized as an example of this, while a meridional variation in the refractivity of the entire system with respect to the pupillary aperture is another factor which appears to be a common cause of the condition. The statement that all astigmatism is due to the anterior surface of the cornea is not now accepted. Indeed the experiment which was conducted by Thomas Young as long ago as 1793 amply disproved it, and it was only the much later vogue of the keratometer which rendered the idea attractive. Today keratometry has few enthusiasts and there are none to be found who would accord it the major place in their routine examination of ametropia.

When we come to consider what are classed as spherical errors we find ourselves confronted by considerable variations from the presumed normal. Our early training leads us to assume that all of these are axial in origin, yet there are certain considerations which indicate that in the absence of fuller and particular knowledge the assumption may be of doubtful validity.

Quite recently there has been a rebellion against the dogma of axial ametropia, and while it would appear that many of the critics tend to go too far in an opposite direction yet the protests made have not been without a distinct utility. The main subject of contention has been the supposed axial nature of myopia. There can be but little doubt that an elongation of the anterior-posterior diameter of the globe is responsible for many of the examples of myopia, but such is not an exclusive cause, for increased curvature of the cornea and of one or both surfaces of the lens can produce a myopia which can with difficulty be distinguished from a purely axial condition. It is true that as Brudenell Carter (1877) and others have pointed out, the cornea may be somewhat flatter in myopia

than in other conditions. The present critics of axial elongation have seized upon the lens as the probable responsible factor but the problem is somewhat more complex than this would seem to indicate.

If we consider the curves of spherical refraction of large groups of people as was done by Steiger, Betsch, Kronfeld and others, it becomes patent that the several examples of ametropia within the groups cannot be conceived as distinct or separate units, but as variants about a common mean. If plotted as a simple graph we see that there is a considerable resemblance between the result and that obtained for any other group of human characteristics. Once again, this may tell us something or nothing for the same curve could be used to indicate the variations in the size of the skull or length of the arms, but it is significant that if we omit the obviously abnormal the similarity is more than suggestive of a normal variation, and many have followed Steiger in claiming that one person is myopic and another hypermetropic for the same reason that one man is tall and the other short in stature.

Have we then to consider the varieties of ametropia as mere variations of the normal? So it would appear from these premises, yet there are difficulties in each particular case which render an unqualified acceptance of this view undesirable. If we exclude all conditions of ametropia above six diopters the curve is reasonably symmetrical and we must agree that an error of six diopters which represents 2 mm. of deficient axial length in hypermetropia and 1.75 mm. of excess in myopia (Nettleship) is well within the limits of a physical variation which given other compensatory factors would result in emmetropia. Thus both myopia and hypermetropia could occur with an "emmetropic" anterior-posterior diameter. From a slightly different point of view Scheere and Betsch came to the conclusion that if all ametropic conditions which had normal fundi only were included the graph would be that of a simple binomial curve.

Probably no one has done more to bring about the change of view with regard to ametropia than E. J. Tron of Leningrad whose work will remain a classic for many years. As a result of careful experimental and direct observational work he has come to the conclusion that the variations of refraction found in emmetropia are sufficient to explain most of the examples of ametropia that are encountered. Thus, according to him, an emmetropic eye can have a dioptric value of from 54.47 D. to 72.1 D. and axial variations from 20.46 mm. to 25.45 mm. Individual variations of the cornea from 37 D. to 48 D. and of the lens from 20.19

D. to 34.09 D. and when these do not occur in compensatory relationship we have ametropia. One has but to appreciate the significance of these things to understand that the pure dogma of axial variation is more than a little questionable.

It has been objected that the fundus changes found in the moderately myopic eye are positive proof that an axial elongation does occur, while there is the so-called "inferior crescent" of the disc described by Fuchs which seems so closely associated with high degrees of hypermetropic astigmatism. Now if it is true that while fundus changes are not common in hypermetropia they are to be found in so many cases of myopia of even slight degrees so that a mere ophthalmoscopic inspection is sufficient to suggest the type of ametropia present, but once again we must pause befor coming to a conclusion. The most striking occurrence is the "myopic crescent." It is true that it is occasionally seen in hypermetropic eyes but so common is it in myopia that it has been considered to be a consequence of the physical cause of the myopia.

There are two reasonable views as to the nature of the crescent. One is that it is a circumscribed atrophy of the particular area of the choroid adjacent to the disc due entirely to the stretching of the globe. Against this it may be urged that the regularity of the outline of the crescent is not such as is usually found in choroidal atrophy, that it is found in other conditions than myopia, while the microscope shows that the sclera and choroid are perfectly healthy beyond the limits of the crescent. A second view which was argued by Schnabel (and later by von Szely) is that the crescent is a congenital defect. He claimed that there was an absence of the anterior layers of the choroid, pigmentation, and retina. In its earliest state the crescent is small but with the normal growth of the eye there is a corresponding increase in its size.

That the cresent is not a consequence of myopic choroiditis is proved from the fact that other choroidal changes do not occur until the myopia has been long established. The problem of the myopic crescent and indeed of the other fundus appearances associated with the condition cannot be said to have been solved and the most that we can say is that the typical fundus changes are concomitants but not necessarily consequences of the myopia. This has been illustrated in no unmistakable manner by a case reported by E. J. Tron, in which there was a myopia of twenty diopters with the characteristic fundus changes of the condition but with an axial length of 22.29 mm.

Hypermetropia has received but little systematic study since the

time of Donders. The evolution of what is known as the dynamic method of retinoscopy by Andrew Jay Cross appeared to promise an increased understanding of the condition, but the promise failed to materialize and it is only of late that a re-orientation in our approach to this method has shown it to have any scientific value and that value does not reach its full measure in the subject we are at present considering. The vast majority of children are born hypermetropic, indeed on any premises the emmetropic child is a potential myope. Authorities differ as to the approximate amount of hypermetropia present at birth, thus F. B. Chavasse considered it to be some five diopters, while Sir W. S. Duke-Elder gives the more conservative estimate of from two and a half to three diopters. Certain it is that in a child not markedly ametropic the subsequent development of the eye results in the low degree commonly encountered.

The view that an emmetropic eye represents the most effective visual organ cannot be entirely substantiated and it would appear that a low degree of hypermetropia represents the standard of normality. This has been recognized though for a different reason by those who have most insisted upon the use of cycloplegics in estimating refractive errors, a full correction is never or almost never prescribed. It is interesting to note that the schematic eye of Gullstrand is not emmetropic but has a hypermetropia of one diopter. Gullstrand considered that it was not possible to be longer than 24 mm. although he thought that post-mortem changes in the human eye would result in it being nearer to 25 mm. rather than any less. The one diopter of hypermetropia is allowed to compensate for the aberration of the dioptric apparatus. Those who have concerned themselves with the various theories which have been propounded to explain the phenomena of dynamic retinoscopy will recall that Prof. J. P. C. Southall of Columbia University, following Gullstrand, has called attention that in what we should consider an emmetropic eye with a pupil of moderate dimension a difference of focus on account of aberration may result in as much as one and a half diopters along the axis. Hence we can appreciate that an eye owing to its own particular construction may reveal a degree of hypermetropia which is not due to deficiency of axial length.

When we turn to purely clinical problems such as the assessment of a correction for a given case of ametropia we are confronted with factors which may have some relationship to what has been considered above. How often is it true that there is considerable doubt as to whether a

quarter of a diopter of spherical power can be accepted or whether we should include an indicated cylinder in the final correction? With the advanced understanding which is being brought to bear upon clinical methods the more patent is it becoming that an accurate method of refractive testing does not exist. At the best the methods we employ are those which permit the closest approximation to the actual needs or optical demands of the case. Routine retinoscopy and subjective testing have valued places in our examination technique but it is well to remember that the final result though visually and neurologically satisfactory leaves much to be desired. Where we have extremely sensitive methods of refraction such as the determination of the degree and position of astigmatism by the crossed cylinder of Jackson we frequently find evidence of residual ametropia that our present optical agents are too gross to correct. It is not to our present purpose to compare the relative merits of objective and subjective methods but one may be permitted to remark that the painstaking confirmation of the objective findings by reasonably accurate subjective methods should never be neglected. D. F. Roessler has remarked with truth in his valuable paper on subjective tests for astigmatism that "objective methods have undisputed value in determining the general optical conditions of an eye, and especially of eyes with bad sight, but for more exact results subjective methods must be used."

The above may serve to show that in attempting to assess the monocular factors operative in ametropia we have something more than a simple problem in physical optics to solve. The older theoretical assumption cannot now be held except with considerable reserve and the future may well show that a pronounced alteration in our methods of approach may have to be made.

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RESOLUTIONS AFFECTING THE FUTURE OF OPTOMETRY

Among the resolutions passed at the recent Forty-seventh Annual meeting of the House of Delegates of the American Optometric Association[1] several had important implications to the profession as a whole. These resolutions indicate that studies are being made of certain matters which vitally affect optometric welfare and that as the result of these investigations the American Optometric Association is on record to act with reference to these timely questions.

[1] Detroit, Mich. June 25, 26, 27 and 28, 1944.

Several of the resolutions deal with the subject of vision in industry, which is a field of preventive eye care in which the optometrist in the post-war period will play an ever increasing part. The American Optometric Association is now on record as insisting that programs of visual care in industry be conducted only by, and under the close supervision of, professional trained specialists who have been educated and licensed to do this work. These resolutions will assist in bringing to an end the growing tendency in industry to engage lay persons to supervise and conduct their visual care programs.

Several other resolutions deal with post-war planning. One in particular urges all state associations to make immediate surveys to determine proper professional locations for optometrists as these return from military service.

The status of optometrists in the U. S. Army was also reviewed and the House of Delegates authorized its officers to continue all efforts to secure commissions for optometrists doing army refracting and to cause to be introduced in Congress suitable legislation to establish an Optometric Army Corps.

The foregoing are all very worthy projects. It is hoped the new officers of the American Optometric Association will carry forward these suggestions to their proper completion. CAREL C. KOCH.

PROGRESS IN ORTHOPTICS

Several months ago, Cohen[1] presented in considerable detail, his techniques relating to the correction of what he termed "functional" myopia. In this particular type of case, Cohen, by means of orthoptic procedures, improved the patient's uncorrected visual acuity from 20/60 to normal.

What Cohen reported has been done time and time again by many optometrists, who through their stimulative treatments have established new relationships between accommodation and convergence, thus in time enabling the patient to have normal vision without resorting to the use of lenses.

About the same time, the National Society for the Prevention of Blindness[2] was commenting on the orthoptic work being done under

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[1] Theodore Cohen. The Control of Myopia. Amer. Jour. Optom. & Arch. Amer. Acad. Optom. Vol. 20, No. 12, p. 421. 1943.

[2] Orthoptic Treatment Aids in the War Effort. Eye Health and Safety News. Vol. 1, No. 3, p. 2, 1943.

medical supervision in the Royal Air Force in England. They report that 90 per cent of pilots referred to medical orthoptists for corrective treatment are returned to their squadrons after three weeks of "overhauling their eyes." According to ophthalmic surgeons, "properly conducted orthoptic treatment offers a good chance of correcting defects associated with visual judgment and certain types of eyestrain." The National Society people, however, point out that the report emphasizes the fact that this type of treatment does not apply to myopia.

It is evident, therefore, that considerable progress is being made in orthoptic techniques on both sides of the Atlantic. For years optometrists have been making marked contributions in this field of eye work, and the treatments mentioned and practiced in England have long been properly and happily used here in America to the lasting betterment of optometric patients.

Optometrists over here, however, go farther than do the physicians in England, as practitioners in this country correct certain low degrees of myopia as well as functional-muscular and fusional problems.

If some low myopic errors can be corrected by orthoptic procedures in the hands of optometrists, it is time that the specialists in both this country and abroad who control the visual work now being done in the armed services of both countries, recognize this fact and make these valuable techniques available to the men in military service.

CAREL C. KOCH.

BOOK NOTICES AND REVIEWS

Books received are acknowledged by notices in this department. Special selections will be made for more extensive review in the interest of our readers as space permits.

CATARACT AND ANOMALIES OF THE LENS, John G. Bellows, M.D., Ph.D. Published by the C. V. Mosby Company, 3523 Pine Blvd., St. Louis, Mo. 624 pages, 208 illustrations and 4 color plates. Cloth, $12.00. 1944.

The author of this book is Assistant Professor of Ophthalmology at Northwestern University Medical School in Chicago. He began his research work on the lens in 1934 in collaboration with other faculty members. His investigations into the chemical and structural changes in the lens in experimental cataract are recognized as most valuable. The bibliography represents a digest of all recent literature. This book

contains a wealth of material which has never before been organized into one volume.

The first five chapters deal with the history of the lens, its embryology, comparative anatomy, growth, structure, composition and metabolism. The last five chapters deal with the various types of cataract. The best comprehension of the clinical material requires some familiarity with the first five chapters, most particularly the chapters dealing with structure, composition and metabolism.

The reader will find the last five chapters of increasing interest as he proceeds from the sixth to the tenth chapter. The sixth chapter is devoted to developmental types of cataract while the seventh discusses cataracts due to radiant energy and certain chemical and toxic types. In chapter eight the author describes the types of cataract which are complications attending other pathology and cataracts due to trauma. The type of cataract due to endocrine dysfunction is discussed in the ninth chapter and in the tenth chapter the author deals with the senile type of cataract.

The subject of cataract will become more important in the future because the present population trend will produce a larger number of aged people which will result in a greater frequency of cataract cases. The present role of the optometrist as a screening agent with respect to cataract is most important and will become more important in the future. To meet this increased responsibility the optometrist will find this book most helpful. In the handling of this type of case there are a lot of questions which arise and to find the best answer one should have access to the latest authoritative opinion. The material in this book has an excellent arrangement and makes it possible for the reader to select quickly the desired section. C. W. MORRIS.

COLOR PERCEPTION TESTING CHARTS. Israel Dvorine, Opt.D., F.A.A.O. Published by the author, 2328 Eutaw Place, Baltimore, Md. Two volumes. 130 colored plates. Printed instructions. Cloth. $25 the set. 1944.

Dvorine needs no introduction to optometrists. He is the author of "Analytical Refraction and Orthoptics," which is one of the most widely publicized and read of the recent books on ocular refraction, and in common with his book on examination techniques Dvorine's new color testing and training charts will also win both wide acclaim and use.

The idea behind these new charts is this. In the past, many persons were screened as being color-blind when, in fact, they were not color-blind at all, but were rather color confused when called upon to discriminate between colors of approximately the same intensity. Due to color ignorance, these patients while able to easily classify red, yellow, blue and green, had considerable difficulty in discriminating between certain shades of these colors or combinations of these colors. Dvorine found that many patients who failed to pass the usual tests for color perception could, after an educational period of training, pass the tests with ease. In these cases the patient was obviously not color-blind but was, on the other hand, color ignorant.

Dvorine also felt that the current sets of pseudo-isochromatic charts could be improved and as a result the present set of testing and training charts was developed. These charts were fully discussed in this Journal in June of this year (Vol. 21, No. 6, pp. 225-235. 1944), by the originator of the charts, Dvorine himself.

Volume one is the testing set. With Dvorine's charts the examiner can select patients who have defective color perception and in addition, the examiner can determine the specific color combinations most confusing to the patient.

If such condition exists, the examiner next turns to that section of volume two wherein a number of color plates will be found for use in training the particular deficiency present in the patient under consideration. In these plates the color combinations are at first very brilliant and become more subdued by gradual stages, each set increasing in difficulty of perception.

Dvorine makes no claim that color blindness can be cured. In fact, true color blindness cannot be corrected—but color deficiency or ignorance can be mastered in so far as this results from a lack of knowledge of the colors themselves. The training set is also equipped with 96 color gradations for the teaching of color nomenclature.

This new testing and training set of charts represents a step in the direction of improving visual skills as these relate to color vision. It is of considerable importance as it initiates a new technique which will do much toward improving the color vision of many patients who are now in part color deficient. Dvorine has again added to the value of optometric procedure, as these charts and the training routine which accompanies them will enable optometrists to further broaden their services to the

public. The new set of color perception testing and training charts belongs in every orthoptic treatment room in America today.

CAREL C. KOCH

TRANSACTIONS OF THE AMERICAN ACADEMY OF OPTOMETRY

by J. Fred Andreae, Secretary

A department devoted to announcements, reports, appointments, organization data, news, professional problems and ideals, as these relate to the Academy.

ANNUAL MEETING OF ACADEMY

The first regular meeting of the Academy since Pearl Harbor will be held at the Stevens Hotel in Chicago this coming December 10, 11 and 12. A list of those who will present papers is impressive and will insure an interesting and informative program. One or two papers may be added at a later date, but those of which we are certain, will give us a well-rounded group of speakers.

Among those who will present papers are Drs. Glenn A. Fry and Henry Hoffstetter of Ohio State University; Drs. R. M. Hall, Matthew Luckiesh and R. S. Jordan of Cleveland, Ohio; Drs. Robert A. Bannon and Rita Walsh of Dartmouth Eye Clinic; Dr. Laurence P. Folsom of South Royalton, Vt.; Dr. Richard Feinberg of New York City; Dr. Carel C. Koch of Minneapolis, Minn.; Dr. Joseph A. Seifert of Detroit, Mich., and Dr. Matt Alpern, United States Army.

It is suggested that you make your hotel and railroad reservations now, thus eliminating today's greatest inconvenience in traveling. If you wait until the last minute you may run into difficulties. Hotel now and railroad thirty days ahead.

Hotel rates are: Single room with bath for one person, $3.25 to $6.00. Double room with double bed and bath for two, $4.75 to $9.00. With twin beds, $6.00 to $12.00.

The formal banquet will be held on Monday evening, December 11, and it is required we advise the hotel management how many plates to provide. This information must be supplied well in advance of the date set and it will be greatly appreciated if you will notify the secretary's office at once of your intentions. This dinner will be one of the high spots of the meeting. Chairman Dan Hummel has obtained an outstanding speaker you will want to hear.

ANNOUNCEMENTS

SEMINAR ON READING DISABILITIES AND CONFERENCE ON READING INSTRUCTION

The Reading Clinic Staff of the School of Education, the Pennsylvania State College, State College, Pennsylvania, is sponsoring two important meetings on reading problems during 1945.

The Annual Seminar on Reading Disabilities will be held from January 29 to February 2, 1945. Demonstrations and discussions on a differentiated program for analyzing and typing, or classifying, reading disabilities will be conducted by the Staff of the Reading Analysis Unit of the Reading Clinic. Remedial techniques will be demonstrated and discussed by the staff of the Reading Clinic Laboratory School. A number of visiting speakers and demonstrators have been included. The program has been planned to interest remedial teachers, school psychologists, speech teachers, neurologists, otologists, and vision specialists.

From June 26 to June 29, 1945, the Reading Clinic Staff will conduct the Annual Conference on Reading Instruction. This conference deals with classroom problems. The activities are differentiated for elementary and secondary teachers, college teachers, special class teachers, speech teachers, and school psychologists.

Copies of the program and information on transportation schedules may be obtained from Miss Betty J. Haugh, Reading Clinic Secretary. Those desiring college credit, especially Graduate School credit, for the seminar should register in advance with the Director of the Reading Clinic.

ABSTRACTS

A department in which will appear abstracts of the literature of optometry, ophthalmology and applied optics. These will be classified according to the following list, although contributions to all sections will not necessarily appear in each issue.

1. Ocular Refraction.
2. Physiological Optics and Color Vision.
3. Ocular Muscles.
4. Orthoptics and Reading.
5. Anatomy, Histology and Embryology.
6. Ocular and General Pathology.
7. Ophthalmic Lenses and Material.
8. Instruments.
9. Hygiene and Illumination.
10. Applied and Physical Optics.
11. Education, Sociology and Economics
12. Miscellaneous.

11. EDUCATION, SOCIOLOGY AND ECONOMICS

ASSIGNMENT OF STUDENTS FOR EXPERIENCE AND SCHEDULING OF CLASSES. J. M. Miller. Minnesota Registered Nurse. 1943, 16, 6, 6-9.

Miller quotes Cabot as follows: "Professional services rendered by physicians and nurses are essential social services. They must be closely integrated with contemporary social conditions and very sensitive to social change. Great social changes are taking place all over the world today. It must therefore follow that unless the professions of medicine and nursing so plan their educational offerings as to keep at least in step with social change, they are likely to fail the country in time of its greatest need." He goes on to add that the change in the accent on medical practice with an increasing shift from diagnosis and treatment to prevention and positive health will also effect a change in the nursing profession. A. V. F.

OPTOMETRY AS A PROFESSION. A. Capurso. Kentucky Optometrist. 1943, 17, 2, 7-10.

"I anticipate the time when they [optometrists] will be expected to possess a general liberal arts background similar to that which is required of dentists, physicians, and engineers. If optometrists are to compare favorably with members of these professions, in the eyes of society, they will be expected to reflect an all-round and general broad educational background and culture. After all, one of the distinguishing features between a trade and a profession is that the latter provides broad learning in addition to the mastery of specialized skills." T. O. B.

REASONABLE CARE AND SKILL. T. G. Atkinson, Optometric Weekly, 1944, 34, 50, 1433-1434.

One hears, says Atkinson, a great deal in optometric circles about professional and organization ethics—the practitioner's attitude and conduct to his patients and his responsibilities to his profession. What one does not hear quite so much about—perhaps not enough—is that immediate aspect of his practice which the law calls "reasonable care and skill," and which it exacts from all professional men. This implies (1) That the practitioner is obligated to keep himself informed of all advance and progress that is being made in his profession and its allied sciences. No one is obligated to keep him informed. The burden rests upon himself, as far as such information is available. (2) That he is obligated to employ these advanced procedures in the care of his patients, at least so many of them as have become authenticated by the consensus of his profession, and are available to him. (3) That he is obligated, further, to arm himself with the equipment and materials necessary to the carrying out of such procedures, or to avail himself, as in many respects the physician does, of laboratories so equipped. No excuse for failure so to equip exonerates him from the reasonable care and skill requirement.

T. O. B.

OPTOMETRY'S FUTURE. Charles Sheard, Journal of the American Optometric Association, 1944, 15, 10, 286-290.

"There are five groups that should be dependently and interdependently grouped together: ophthalmology, optometry, opticianry, ophthalmic manufacturers, ophthalmic distributors. Of the group, the only one that could claim independence to the maximal degree is ophthalmology. But ophthalmology in particular and medicine in general are beginning to realize that the strength of health service lies in adequate training and skill, and that all this training and skill cannot be possessed by one man or, if so granted, used advantageously. So optometry can be independent in its circumscribed field of activity—stated in the definition of optometry—but is definitely dependent in its professional services and relationships in that it cannot treat disease or perform operations. Therefore, the professional independence of optometry is quite definitely limited: hence it is dependent in its independence." T. O. B.

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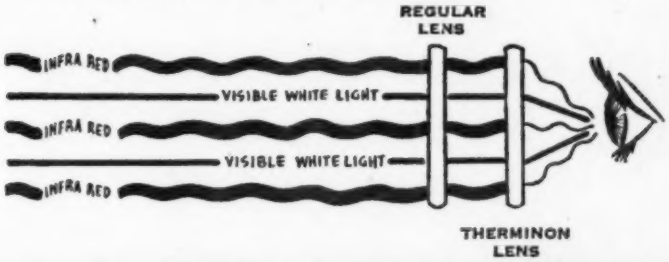

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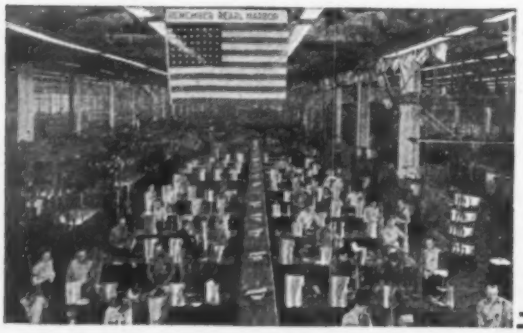

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About one-half of the space is devoted to technical articles, and the remaining half is given over to special departments, editorials, abstracts and book reviews, in large part original.

The papers and reports are original and are accepted only with the understanding that they are to be published in this journal exclusively.

The editors of the American Journal of Optometry and Archives of American Academy of Optometry beg to offer the following suggestions to authors who propose to favor them with the publication of their contributions:

I. Write on one side of the paper. Double-spaced, typewritten MS. is preferred.

II. Words to be printed in *italics* should be underscored once, in SMALL CAPS twice, and in LARGE CAPITALS three times. Antique type when called for should be so marked.

III. Be sure that the title of your paper indicates its contents. Should the subject be a general one, for instance, Case Reports, it would be well to mention the subject of each special report—for instance: Case One. Progressive Myopia with Exophoria. Case 2. Divergent Squint with Amblyopia. These special titles will appear in the table of contents of each number.

IV. Illustrations should be carefully drawn with India Ink on separate sheets.

V. When authors receive proofs for revision, they should correct and return these without delay. We beg, however, to remind our contributors that changes in the manuscript necessitates resetting, this causing much additional expense, so we ask that alterations be limited to what is of essential importance.

VI. Because of the added cost, we have discontinued the giving of gratuitous reprints to our authors, but we will supply them with these at the cost of press work and paper where so desired. The following tables of charges will apply for the year 1944.

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Management and circulation as required by the Act of Congress of August 24, 1912, of the AMERICAN JOURNAL OF OPTOMETRY AND ARCHIVES OF AMERICAN ACADEMY OF OPTOMETRY, published at Minneapolis, Minnesota, for October 1, 1944.

State of Minnesota, County of Hennepin—ss.

Before me a Notary Public in and for the State and County aforesaid, personally appeared Dr. Carel C. Koch, who having been duly sworn according to law, deposes and says that he is Editor and Publisher of the AMERICAN JOURNAL OF OPTOMETRY AND ARCHIVES OF AMERICAN ACADEMY OF OPTOMETRY and that the following is to the best of his knowledge and belief, a true statement of the ownership and management of the aforesaid publication for the date shown in the above caption required by the Act of August 24, 1912, embodied in Section 411, Postal Laws and Regulations, to-wit:

First, that the names and addresses of the Publisher and officers are as follows: Publisher and Editor, Dr. Carel C. Koch, 1501-1504 Foshay Tower, Minneapolis, Minn.; Associate Editors, R. H. Ehrenberg, Granite Falls, Minn., and Dr. Clarence W. Morris, 232 Utility Building, Fort Wayne, Ind.; Advertising Manager and Production Manager, Mr. Harry B. Brookins, 700 South Fourth Street, Minneapolis, Minn.; Circulation Manager, Lilly L. Koch, 1501-1504 Foshay Tower, Minneapolis, Minn.

Second, that the owner is the American Journal of Optometry Publishing Association, Dr. Carel C. Koch, President and Treasurer; R. H. Ehrenberg, Vice President; Lilly L. Koch, Secretary.

Third, that there were no bondholders, mortgagees, or other security holders owning or holding one or more per cent of the total amount of bonds, mortgages or other securities of this publication.

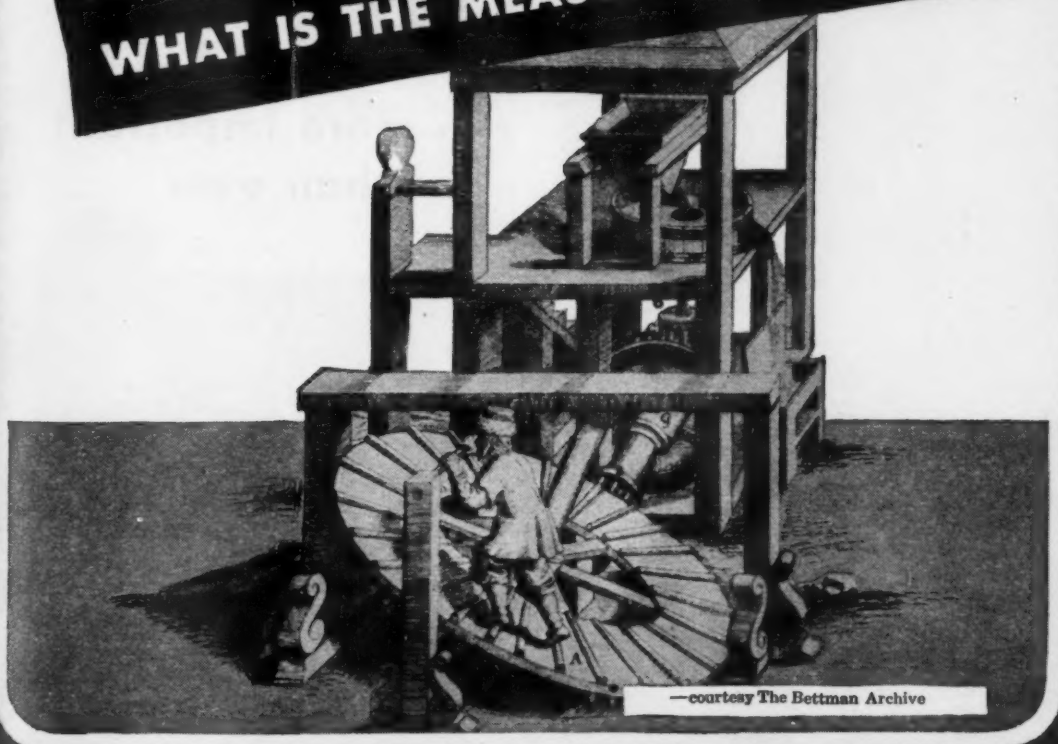
DR. CAREL C. KOCH, Editor and Publisher,
The American Journal of Optometry.

Sworn and subscribed before me this 21st day of September, 1944.

EDITH DONGOSKE, Notary Public,
Hennepin County, Minnesota.

My commission expires August 18, 1949.

WHAT IS THE MEASURE OF MERIT?



—courtesy The Bettman Archive

In 1607 the Italian engineer, Vittorio Zonca, proposed this "windless windmill." If it had been practicable it would have ground grain day in and day out, completely independent of wind which was so necessary for the operation of ordinary mills. In Zonca's mill the operator would walk on a revolving treadmill which turned the main shaft. But his invention never enjoyed wide usage. Easier and better ways of doing the job soon supplanted it.

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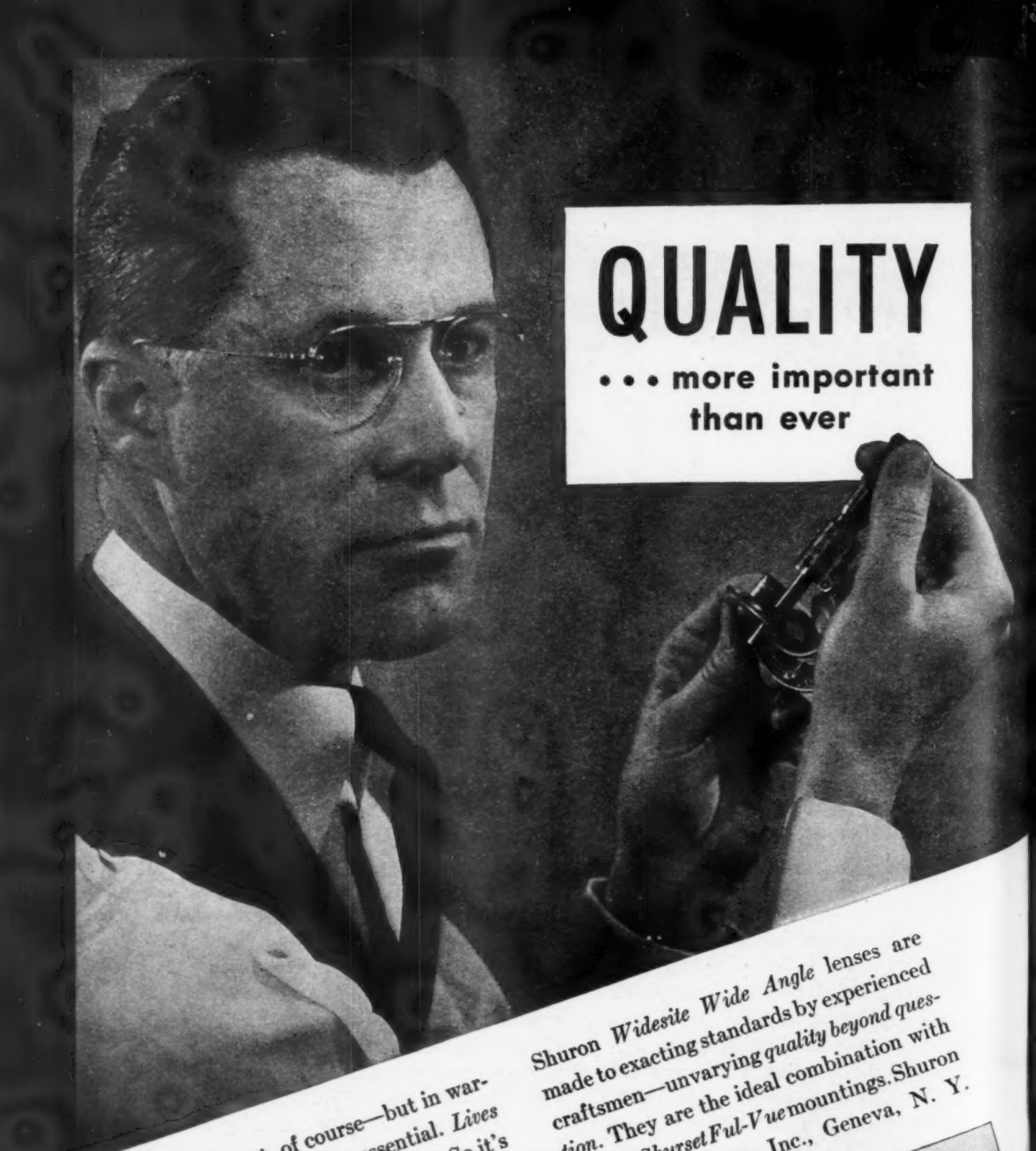

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